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Global Estimates and Projections of Mortality by Cause, 1970-2015

Rodolfo A. Bulatao
and
Patience W. Stephens

Global estimates and projections of death, by cause, for 1970, 1985, 2000, and 2015 — results, methods, tables, and expert assessments for selected diseases and conditions.

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This paper — a product of the Population Policy and Advisory Service, Population and Human Resources Department — was prepared as background for the Health Sector Priorities Review. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Otilia Nadora, room S6-065, extension 31091 (October 1992, 83 pages).

Bulatao and Stephens report estimates and projections of deaths by cause for major world regions, based on data from country reports to the World Health Organization and regression models. They report mortality rates for seven major causes: infectious and parasitic diseases, neoplasms, circulatory system diseases, complications of pregnancy, certain perinatal conditions, injury and poisoning, and other causes. Some more specific causes are reported on. They give estimates for six age groups by sex for four years (1970, 1985, 2000, and 2015) and six country groups: industrial market economies, industrial nonmarket economies, Latin America and the Caribbean, Sub-Saharan Africa, the Middle East and North Africa, and Asia and the Pacific.

Among their findings:

- The population over 45 in developing countries is projected to more than double between 1985 and 2015, rising from 17 to 24 percent of the population. Causes of death, which are closely related to age at death, must change accordingly.

- Infant mortality in developing countries is projected to fall from 78 per thousand in 1985 to 43 per thousand in 2015 and life expectancy at birth in developing countries is projected to rise by five years.

- The leading causes of death for the world as a whole for both 1970 and 1985 were infectious and parasitic diseases and circulatory system diseases — with the first more important in developing countries, and the second more important in developed countries. Certain perinatal conditions were also more important for developing countries, but accounted for only a fourth or a fifth as many deaths in 1985. Neoplasms were more important in developed than in developing countries.

- Deaths from infectious diseases are expected to decline as a percentage of deaths; proportionate deaths from discases of the circulatory system are expected to rise.

- The greatest number of deaths will continue to be in Asia, where almost half of all deaths in the world take place. This proportion is not projected to change.

- Better data on causes of death are essential. The World Health Organization is working with countries to strengthen their cause-of-death information systems as an essential support for health monitoring.

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GLOBAL ESTIMATES AND PROJECTIONS OF MORTALITY BY CAUSE, 1970-2015

Rodolfo A. Bulatao and Patience W. Stephens

Contents

Acknowledgments iv

Background 1

Method 2
- Grouping causes of death 2
- Data on causes of death 3
- Estimating and projecting mortality 4
- Predicting mortality rates by cause 4

Results 5
- The demographic background 5
- Current causes of death 6
- Trends in major causes of death 13
- Age-sex specific patterns 17

Discussion 18

Annex A. Methodology 21
- Data on causes of death 23
- Projecting mortality 23
- Predicting deaths by major cause 26
- Estimating deaths by specific cause 27
- Reclassifying deaths from unspecified causes 28

Annex B. Supplementary Tables 28

Annex C. Expert Assessments 68
- Diarrhea 69
- Polio 76
- Yellow fever, dengue, and encephalitis 77
- Malaria 78
- Schistosomiasis and filariasis 79
- Complications of pregnancy 80
- Diabetes 81

References 81

List of Tables

Table 1. Classification of causes of death and corresponding International Classification of Diseases, Injuries, and Causes of Death (ICD) categories 2
Table 2. Estimated and projected mortality rates (per 100,000), by major cause, sex, and region, 1970–2015 7
Table 3. Deaths by major and specific cause (in thousands), by region, 1985 10
Table 4. Age-standardized mortality rates (per 100,000) for major and specific causes, by region, 1985 11
Table 5. Comparison of regression estimates of mortality rates and deaths from particular causes and expert assessments, all developing countries, 1985 12
Table 6. Ratio of deaths from circulatory system diseases to deaths from infectious and parasitic diseases, by region, 1970–2015 15
Table 7. Percentage distribution of deaths by major cause in 1985 and incremental changes expected by 2000 and 2015 from three factors, world and developed and developing countries 16
Table 8. Percentage distribution by major cause of all deaths, deaths under 65, and potential years of life lost, world and developed and developing countries, 1970–2015 18
Table 9. Percentage of regional population covered by reports to WHO or sample surveys, by year 19
Table 10. Predicted and reported percentage distributions of deaths by cause for reporting countries grouped by region, 1985 20
Table A1. Regional grouping of countries and territories 22
Table A2. Countries or territories with reliable reports on causes of death, and year of data used, by region 24
Table A3. Countries or territories with less reliable reports on causes of death, year of data used, and indices of coverage and data quality, by region 25
Table B1. Population in millions by age and sex, major world regions, 1970–2015 29
Table B2. Estimates and projections of fertility, mortality, and population growth for major regions in selected quinquennia 31
Table B3. Mortality rates per 100,000 from major causes, by age, sex, and region, 1970–2015 32
Table B4. Mortality rates per 100,000 from major causes, by age, sex, and region, 1970–2015 44
Table B5. Mortality rates per 100,000 from specific causes by age, sex, and region, 1985 56
Table B6. Deaths in thousands from specific causes by age, sex, and region, 1985 62

Table C1. Comparison of estimated deaths from certain specific causes in developing countries around 1985 with Walsh assessment 68
Table C2. Expert assessments of mortality rates (per 100,000) and deaths (in thousands) for some specific causes, by age, sex, and region, 1985 70

List of Figures

Figure 1. Life expectancy by region 6
Figure 2. Infant mortality by region 6
Figure 3. Mortality by cause, world, 1970–85 9
Figure 4. Deaths by cause, developed countries, 1970–2015 13
Figure 5. Deaths by cause, developing countries, 1970–2015 14

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Estimates and projections of deaths by cause for major world regions are reported here. The sources for these estimates are country reports to the World Health Organization (WHO) and regression models.

Mortality rates will be reported for seven major causes—infectious and parasitic diseases, neoplasms, circulatory system diseases, complications of pregnancy, certain perinatal conditions, injury and poisoning, and other causes—and for more specific causes under some headings. For the major causes, predictive equations depending on the overall mortality level were previously estimated to supplement reported data; for the specific causes, WHO data and some new equations will be the basis.

Estimates were made for six age groups (0, 1–4, 5–14, 15–44, 45–64, and 65 and older) by sex for four years (1970, 1985, 2000, and 2015) and six country groups—industrial market economies, industrial nonmarket economies, Latin America and the Caribbean (LAC), Sub-Saharan Africa, the Middle East and North Africa (MENA), and Asia and the Pacific. Classification of countries as industrial or developing (Annex A) is as of 1985.

The objective, approach, and background of the exercise are discussed; the methodology is described; current and projected distributions of death by cause are presented and contrasted among regions; and the reasonableness of and possible biases in the estimates are assessed.

Background

The main objective of this exercise is to provide a comprehensive picture of the distribution of deaths by underlying cause for 1985 and a general perspective on how the distribution can be expected to change. We attempt to classify current deaths by both major and specific cause, but project only the major causes into the future.

The approach is to summarize reports of causes of death to WHO and supplement these with regression estimates for nonreporting countries. An alternative would have been to consider diseases or disease groups one by one, building up a composite picture from the epidemiological literature. Though disease experts have been canvassed for information on this literature, we do not rely primarily on this approach because it would lead to inconsistencies between estimates for different diseases and would provide overall mortality rates at odds with other mortality data.

The approach taken follows work initiated by Preston (1976) and continued by Hakulinen and others (1986a, 1986b), whose age-sex specific equations for major causes of death are used here. This regression-based approach has also been applied to particular areas, such as cancer deaths (Parkin and others 1988).

Hakulinen and others estimated the distribution of deaths by major cause as of 1980. We update their estimates to 1985, incorporate new data not available to them, attempt a more detailed classification of causes, and provide perspectives on possible future trends.

Method

This section covers categories of causes of death; the nature and quality of the base data; the estimation and projection of mortality; the equations used to disaggregate mortality by major cause; and procedures for subdividing major causes into specific categories.

Grouping causes of death

The categories for major causes of death shown in Table 1 are identical to those used by Hakulinen and others to permit the application of their equations. These categories require some explanation. Bronchitis, emphysema, and asthma are included among the infectious and parasitic diseases because of the important infectious bronchitis component, which was not separable from the others because of the way the

Table 1. Classification of causes of death and corresponding International Classification of Diseases, Injuries, and Causes of Death (ICD) categories

Cause of death category		*ICD-8 (List A)*	*ICD-9 (Basic tabulation list)*
Major causes			
1	Infectious and parasitic diseases	A1–44, A99, A90–93	01–07, 320–323
2	Neoplasms	A45–61	08–17
3	Circulatory system and certain degenerative diseases	A80–88, A64, A98, A102, A105–106	25–30, 181, 341, 347, 350
4	Complications of pregnancy	A112–118	38–39, 41
5	Perinatal conditions	A131–135	45
6	Injury and poisoning	AE138–150	E47–E56
7	Other causes	Other codes	Other codes
Specific causes			
1.1	Diarrhea	A1–5	01
1.2	Tuberculosis	A6–10	02
1.3	Acute respiratory infection	A15–17, A89–92	033–035, 320–322
1.4	Measles	A25	042
1.5	Chronic obstructive pulmonary disease (COPD)	A93	323–325
1.6	Polio	A22–23	040, 078
1.7	Yellow fever, dengue, and encephalitis	A26–27	044–045
1.8	Malaria	A31	052
1.9	Schistosomiasis and filariasis	A39, A41	072, 074
1.10	Intestinal parasites	A42–43	075–076
3.1	Ischemic heart disease	A83	27
3.2	Cerebrovascular disease	A85	29
3.3	Other cardiovascular diseases	A80, A82, A84, A86–88	25, 26, 28, 30
3.4	Diabetes	A64	181
3.5	Certain degenerative diseases (nephritis, cirrhosis of the liver, ulcers of the stomach and duodenum)	A98, A102, A105, A106	341, 347, 350
7.1	Mental disorders	A69	210–212
7.2	Oral health diseases	A97	330
7.3	Micronutrient disorders	A62–63, A67	180, 193, 200
7.4	Malnutrition	A65	190–192

Note: The specific diseases listed under infectious and parasitic diseases (1.1–1.10) and under other causes (7.1–7.4) are not meant to be comprehensive.

data were reported. Diabetes, nephritis, cirrhosis of the liver, and ulcers of the stomach and duodenum have been included among circulatory system diseases not because of any presumed similarity in etiology or pathogenesis but to keep the number of categories manageable by combining the degenerative diseases other than cancer.

Hakulinen and others also included in their analysis two subcategories for infectious and parasitic diseases: diarrhea, gastritis, and enteritis; and influenza, pneumonia, and bronchitis. Only the diarrhea subcategory is maintained as a specific cause. The second subcategory is further refined into infectious and chronic components. Other subcategories for specific causes of death (Table 1) were chosen to break up the three largest of the major categories—infectious and parasitic diseases, circulatory system diseases, and other causes. Subcategories were chosen mainly for substantive interest. The diarrhea subcategory is duplicated among these specific causes, but the influenza, pneumonia, and bronchitis subcategory is replaced by others somewhat more specific. These breakdowns also allow distinction of the specific causes just noted that fit awkwardly into the major categories.

Among the specific causes, not all could be defined with precision. For micronutrient disorders, for instance, the codes selected from the revision currently in use (the ninth) of the International Statistical Classification of Diseases, Injuries, and Causes of Death (ICD-9; WHO 1977) were those for disorders of the thyroid gland, anæmias, and avitaminosis. This group of causes may be both too broad and too narrow in different ways, but further specification was not possible.

Data on causes of death

Statistics on causes of death, by sex and age, based on the International Classification of Diseases are provided annually to WHO by some 70 countries or territories. In principle, the cause of death returns should be comparable between countries since they are based on a common set of procedures for coding and certifying the cause of death. In practice, however, the comparability of data across countries is affected by variations in diagnostic preferences, cultural factors, medical training, the availability of diagnostic aids, and other factors.

In addition, the reliability of national cause of death statistics is a matter of concern. Broadly speaking, reliability depends on coverage and quality. Deaths not covered by the vital registration system are most likely those in more remote areas with a cause of death structure typical of high mortality populations. Thus countries with incomplete coverage are likely to report a cause of death structure biased towards the chronic diseases pattern more commonly found in urban areas; the greater the incompleteness, the more biased the data are likely to be. However, of even greater significance with respect to reliability is the extent of medical certification of the cause of death, which ensures data quality. In remote areas with few if any physicians, cause of death is frequently certified by lay personnel who have little or no medical training. Diagnosis is uncertain and many deaths may be coded to symptoms and ill-defined conditions.

Further details about the reliability of the data and the incorporation of estimates from subnational information can be found in Annex A.

The reports on cause of death will be used as they are in this paper, without attempting corrections such as regrouping codes or reallocating the undefined causes. We rely on the original WHO procedures for scrutinizing the data before including them in their mortality database, and do not attempt any reclassification. Nor do we attempt the adjustments that might be needed to take associated or contributory conditions into account. It is difficult to predict how the importance of associated causes will alter as countries progress through the epidemiological transition. Certainly under the regime of infectious diseases, malnutrition will frequently underlie many deaths from diarrheal diseases or acute respiratory infections. On the other hand, as death is increasingly postponed to older ages, multiple pathologies at or near the time of death become relatively common. As a result, this paper can only concern itself with reported distributions of underlying causes of death.

Estimating and projecting mortality

Before estimating deaths by cause, overall mortality must be estimated and projected. This was done country by country, for 187 countries, territories, or groups of small countries or territories covering the entire world (but only aggregate results are reported). Life expectancy and infant mortality estimates for the 1985–90 quinquennium were obtained from the best available sources; adjustments were made as needed for agreement with other demographic parameters; and both forward and backward population projections were made.

Each country's experience with mortality change is used to project its mortality over the next three quinquennia (1990–2005), after which each country reverts to the average mortality trend for the world as a whole. This average trend involves slower improvements as life expectancy rises. The procedure involves separate projections of life expectancy (for each sex) and infant mortality (for both sexes combined), the imposition of nonlinear trends on both, and the choice of "split" life tables. Further description of the procedures is provided in Annex A.

The projections using these mortality trends are the "standard" Bank projections (see Bulatao and others 1990). Two types of alternative projections were also run: "fixed mortality" projections, in which age-specific mortality rates (for five-year age groups) are taken as fixed at 1985–90 levels throughout the projection period; and "fixed distribution" projections in which mortality changes as in the standard projections, but the distribution of deaths by cause within each of the six larger age groups does not change from 1985. These alternative projections allow some decomposition of projected changes in the cause of death structure.

Predicting mortality rates by cause

The equations for major causes of death predict mortality rates by cause from age and sex specific mortality rates for all causes. These equations are all linear. Because some of the age groups covered a broad range of ages, slight variations in the equations

were produced to take into account differences among 24 world regions in age structure within these age groups. This was not necessary for age groups 0 and 1–4, for which therefore only world equations are available. The derivation of these equations is explained in Hakulinen and others (1986a), and they are further described in Annex A.

These equations were used to predict mortality rates by cause wherever reported data were not available. The reported data themselves were adjusted proportionally where necessary to provide the overall mortality levels estimated by the Bank.

New regression equations were estimated for mortality rates from 21 specific causes, using the rate for the major cause under which each falls as the predictor. These 21 causes include the 19 listed in the second part of Table 1 and two "other" subcategories, under infectious and parasitic diseases and under other causes, estimates for which were obtained as residuals from the major causes. No "other" subcategory is needed under circulatory system diseases because the subcategories are already comprehensive. The regression procedure is explained in Annex A.

As was done for the major causes, the equations were first used to estimate mortality rates by cause, age, sex, and country, and for each age-sex group in each country, rates were adjusted proportionally if necessary to provide the expected totals. Deaths from ill-defined causes were not reclassified under other categories, but estimates were made of the maximum possible increase in each category from such reclassification. Annex A provides details.

Some of the equations were clearly less robust than those for the major causes. They appear especially unreliable for various tropical diseases prevalent in regions that are poorly represented in the WHO database. Experts on particular diseases were shown the regression estimates and asked about appropriate adjustments. The responses varied from acceptance of the estimates to detailed recommendations for revision, based on survey evidence of cases and case-fatality rates and on individual judgments. Since the recommendations sometimes appeared considerably at variance with reported deaths and regression estimates, they are presented and discussed separately.

Results

The demographic background and projected trends in overall mortality will be described, and then estimates of current mortality by cause will be presented. Next, trends in the major causes of death will be considered, and patterns of causes of death by age and sex will be discussed.

The demographic background

Population estimates and vital rates for each of the six regions, drawn from the Bank projections, are provided in Annex B. As will be shown, demographic variables contribute to important changes in cause of death distributions. For instance, the population in developing countries over 45 is projected to more than double between 1985 and 2015, rising from 17 to 24 percent of the population. Causes of death, which

are closely related to age at death, must change accordingly. Mortality from all causes will change, with infant mortality in developing countries projected to fall from 78 per thousand in 1985 to 43 per thousand in 2015 and life expectancy at birth in developing countries projected to rise by five years. This too implies changes in causes of death, which vary by mortality level.

Projected trends in life expectancy and infant mortality, both showing continual improvement, are represented in Figures 1 and 2. Based on worldwide and individual country experience of mortality change, these projections effectively assume that factors that have produced improvement in the past, whether socioeconomic or medical, will continue to produce improvement in the future. No country was allowed to retrogress in these projections, although retrogression is of course possible. Even with projected improvements, however, regional differentiation will remain sharp: by 2015, life expectancy in Sub-Saharan Africa will have barely caught up with 1985 life expectancy in the Middle East and North Africa, and will not have caught up with 1985 life expectancy in any other region.

Current regional crude death rates vary as one would expect, being clearly highest in Sub-Saharan Africa and lowest in Latin America and the Caribbean. The latter region has more young people than the developed country regions, which accounts for its lower risk of death. With the projected improvements in life expectancy, the crude death rate is not expected to fall monotonically. Once the rate reaches a point around 5 to 10 per thousand, regions generally experience a bottoming out of decline and then a slight increase in deaths as their elderly populations increase. Given these trends, variability across regions in crude death rates is projected to diminish considerably by 2000 and 2015.

Current causes of death

Estimated mortality rates by major cause are shown in Table 2 by sex and region, but without age breakdowns. (Three Asian subregions—India, China including Taiwan, Hong Kong, and Macao, and other Asia are also shown.) Patterns for 1970 and 1985 will be considered first. The leading causes of death for the world as whole for both 1970

Figure 1. Life expectancy by region

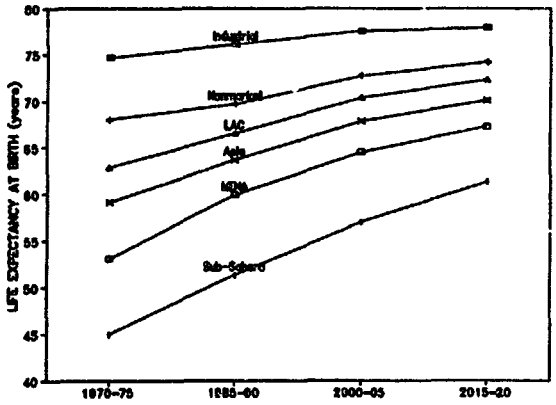


Figure 2. Infant mortality by region

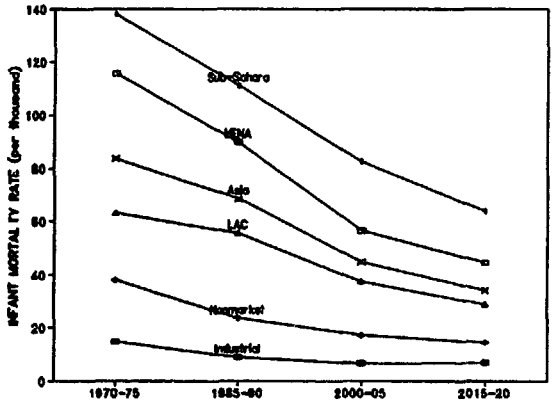


Table 2. Estimated and projected mortality rates (per 100,000), by major cause, sex, and region, 1970–2015

Region and cause	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
World								
All causes	1293	1281	1064	1004	863	802	880	776
Infections	449	449	318	294	176	179	140	133
Neoplasms	95	96	108	96	108	98	128	114
Circulatory	297	324	262	286	292	283	339	314
Pregnancy	0	13	0	9	0	9	0	7
Perinatal	86	70	79	59	48	36	37	27
Injury	93	40	97	56	78	31	79	32
Other	273	289	201	204	161	167	157	150
Developed Countries								
All causes	1054	1069	1047	1013	997	963	1161	1059
Infections	146	112	109	74	78	59	90	63
Neoplasms	167	163	203	172	182	170	213	188
Circulatory	463	552	473	563	486	536	575	597
Pregnancy	0	2	0	1	0	1	0	1
Perinatal	26	10	15	10	13	9	13	7
Injury	99	51	87	40	77	37	80	39
Other	153	180	161	154	160	152	191	163
Developing Countries								
All causes	1383	1373	1070	1001	830	759	823	714
Infections	564	595	382	368	200	211	150	148
Neoplasms	68	68	78	70	90	79	111	98
Circulatory	234	225	198	192	244	216	291	252
Pregnancy	0	18	0	12	0	11	0	9
Perinatal	109	96	98	75	56	43	42	31
Injury	91	35	100	62	78	29	79	30
Other	318	336	213	221	162	171	150	147
Industrial Market								
All causes	1036	1021	986	950	1007	943	1173	1045
Infections	106	85	82	66	64	47	68	38
Neoplasms	186	169	240	192	196	171	236	200
Circulatory	500	567	461	518	513	551	615	639
Pregnancy	0	0	0	0	0	0	0	0
Perinatal	21	7	8	5	10	6	10	5
Injury	98	58	74	40	70	36	74	40
Other	125	135	120	128	154	131	171	123
Nonmarket								
All causes	1089	1155	1162	1126	980	1000	1139	1082
Infections	224	159	158	88	103	79	128	106
Neoplasms	129	152	136	135	158	169	173	168
Circulatory	392	524	495	644	437	509	505	526
Pregnancy	0	4	0	3	0	2	0	2
Perinatal	37	15	28	17	20	13	19	11
Injury	100	40	109	39	90	38	90	37
Other	209	260	237	200	172	189	225	231
Latin America and Caribbean								
All causes	1097	903	883	706	677	557	722	594
Infections	366	301	211	177	100	86	67	55
Neoplasms	79	76	76	70	94	86	122	109
Circulatory	238	214	228	196	242	215	306	275
Pregnancy	0	12	0	6	0	4	0	3
Perinatal	61	42	65	44	40	28	30	20
Injury	98	31	90	29	76	28	78	29
Other	255	227	213	184	124	111	119	102

Table 2 (continued)

Region and cause	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Saharan Africa								
All causes	2163	1882	1727	1448	1196	1024	947	785
Infections	1070	937	817	683	498	430	346	286
Neoplasms	52	57	52	55	54	55	60	60
Circulatory	243	226	209	191	182	169	180	162
Pregnancy	0	27	0	21	0	17	0	14
Perinatal	200	157	167	129	119	90	82	61
Injury	108	39	96	34	86	30	82	28
Other	491	438	386	334	258	233	196	174
Middle East and North Africa								
All causes	1563	1520	1184	1121	775	733	691	624
Infections	624	653	459	473	209	237	142	164
Neoplasms	60	56	65	60	69	62	81	70
Circulatory	250	224	200	183	191	171	209	176
Pregnancy	0	21	0	13	0	12	0	10
Perinatal	140	126	120	97	73	57	52	39
Injury	90	37	80	32	75	28	76	28
Other	400	404	260	263	157	166	131	137
Asia								
All causes	1280	1342	963	946	784	736	833	734
Infections	506	577	319	323	149	176	110	119
Neoplasms	70	70	85	74	101	87	130	113
Circulatory	230	227	191	194	268	235	338	292
Pregnancy	0	17	0	11	0	10	0	8
Perinatal	98	91	88	67	42	32	30	22
Injury	87	34	105	78	77	29	79	31
Other	289	327	175	199	147	167	145	149
India								
All causes	1491	1575	1158	1165	879	790	846	745
Infections	600	707	478	476	215	239	152	175
Neoplasms	70	66	43	51	88	74	108	91
Circulatory	270	249	145	126	253	204	295	239
Pregnancy	0	27	0	22	0	12	0	10
Perinatal	123	122	168	132	60	48	40	30
Injury	96	35	85	65	82	28	84	29
Other	332	369	239	293	180	185	167	171
China								
All causes	978	1115	777	793	700	693	847	738
Infections	354	449	186	204	63	104	48	46
Neoplasms	76	78	126	98	123	103	167	144
Circulatory	205	224	216	249	306	276	417	368
Pregnancy	0	8	0	2	0	7	0	4
Perinatal	63	60	34	22	23	17	18	13
Injury	78	34	127	111	71	30	72	34
Other	203	263	87	106	114	156	125	129
Other Asia								
All causes	1603	1482	1047	938	802	739	793	715
Infections	686	657	354	338	206	213	150	158
Neoplasms	59	59	67	63	79	76	102	95
Circulatory	228	206	204	182	226	209	274	246
Pregnancy	0	21	0	14	0	13	0	10
Perinatal	133	110	81	62	49	36	35	25
Injury	94	35	90	36	81	28	84	29
Other	403	394	251	244	160	163	149	152

and 1985 were infectious and parasitic diseases and circulatory system diseases, the first more important in developing countries and the second more important in developed countries. Like infectious and parasitic diseases, certain perinatal conditions were much more important for developing countries, but over all countries accounted for only a fourth or a fifth as many deaths in 1985. Like circulatory system diseases, neoplasms were more important in developed than in developing countries, but over all countries accounted for only a third as many deaths. The other causes category and injury and poisoning provide weak contrasts between developed and developing countries, and complications of pregnancy accounts for a small proportion of deaths.

Figure 3 compares these results with estimates that Hakulinen and others (1986a) made for 1980. Although the equations were the same, Hakulinen and others incorporated earlier reported data for fewer countries. Nevertheless, results are generally consistent, with their estimated rates for 1980 usually being intermediate between our 1970 and 1985 estimates. Comparisons for specific regions are complicated by some differences in country groupings, but also show general agreement. For Sub-Saharan Africa, Hakulinen and others did assume slightly higher overall mortality levels than we use, but their distribution of deaths across causes is still similar to ours.

Taken at face value, these estimates also indicate that substantial change can take place in a short period. For developing countries, the mortality rate for infectious and parasitic diseases is estimated to have declined 17 percent from 1970 to 1980, and 22 percent from 1980 to 1985.

Breakdowns for 1985 of the three largest categories of major causes are summarized in Table 3, which gives numbers of deaths for both major and specific causes. Table 4 provides mortality rates standardized using the 1985 world age structure. (Annex B gives rates and deaths by sex, age, and region.)

Figure 3. Mortality by cause, world, 1970-85

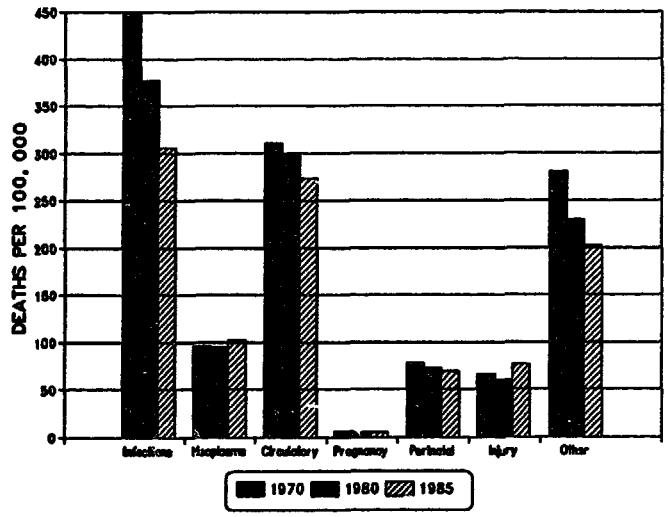


Table 3. Deaths by major and specific cause (in thousands), by region, 1985

Cause	*World*	*Developed*	*Developing*	*Industrial*	*Non-market*	*LAC*	*Sub-Saharan Africa*	*Middle East and North Africa*	*Asia*
All causes	49899	12047	37852	7313	4735	3183	7203	4314	23151
Infectious, parasitic	14764	1061	13704	558	503	778	3403	1743	7780
Diarrhea	2997	20	2977	5	15	201	1158	507	1111
Tuberculosis	844	39	805	13	25	48	119	76	562
Acute respiratory	5549	422	5127	271	151	286	1407	741	2693
Measles	421	1	420	0	1	16	196	87	121
COPD	1943	334	1608	248	87	113	226	160	1110
Polio	25	1	25	0	0	2	3	2	18
Yellow fever	8	0	8	0	0	0	2	1	5
Malaria	146	0	146	0	0	6	20	16	105
Schistosomiasis	12	0	12	0	0	0	0	1	10
Intestinal parasites	133	3	130	0	2	7	41	18	65
Other infectious	2686	240	2446	20	221	99	230	135	1981
Neoplasms	4903	2190	2714	1629	560	294	242	235	1943
Circulatory	13208	6075	7133	3704	2371	848	909	715	4661
Ischemic heart	3948	2426	1522	1407	1019	213	216	190	904
Cerebrovascular	3813	1547	2266	873	674	176	193	158	1738
Other cardiovascular	3705	1603	2103	1075	527	302	347	254	1199
Diabetes	507	159	348	129	30	62	55	42	189
Certain degenerative	1235	340	895	220	120	96	97	70	631
Pregnancy	225	8	218	0	7	12	48	23	134
Perinatal	3321	143	3178	51	92	218	672	408	1880
Injury, poisoning	3694	729	2965	429	299	239	294	212	2220
Other	9784	1842	7941	941	902	795	1635	978	4534
Mental disorders	95	46	50	36	10	5	4	3	38
Oral health diseases	3	1	2	0	0	1	0	0	1
Micronutrient	252	42	210	20	23	23	45	27	115
Malnutrition	372	26	346	6	20	24	67	37	218
Unspecified	9061	1728	7333	879	849	742	1519	911	4162

As noted earlier, chronic obstructive pulmonary disease, though it is not infectious, was included for convenience among the infectious and parasitic diseases. This is one of the four specific causes that dominate this major category. The other three are diarrhea, acute respiratory infections (pneumonia, influenza, acute bronchitis, whooping cough, and diphtheria, but not measles, which has been separated), and other infectious and parasitic diseases. In every region, these four account for at least nine out of ten deaths from this major cause. Tuberculosis and measles account for a few percent more, and the remaining categories are quite rare. Among the four dominant causes, the balance varies considerably across regions. A major contrast is the greater importance of chronic obstructive pulmonary disease in developed regions and the greater importance of diarrhea in developing regions. Acute respiratory infections, being important in both developed and developing regions, overall is responsible for a larger share of deaths than either of these two causes. The predominance of these four specific causes in these estimates accurately reflects the data reported to WHO. For instance, for reporting Latin American countries, acute respiratory infections account for a quarter to a half of all deaths due to infectious diseases in each age-sex group, and

Table 4. Age-standardized mortality rates (per 100,000) for major and specific causes, by region, 1985

Cause	*World*	*Developed*	*Developing*	*Industrial*	*Nonmarket*	*LAC*	*Sub-Saharan Africa*	*Middle East and North Africa*	*Asia*
All causes	1046	692	1147	578	894	901	1621	1243	1077
Infectious, parasitic	308	77	386	43	126	199	658	422	350
Diarrhea	62	2	78	1	5	48	221	114	47
Tuberculosis	18	3	25	1	5	14	33	24	25
Acute respiratory	116	29	141	20	40	72	258	173	120
Measles	9	0	10	0	0	4	31	17	5
COPD	41	18	54	18	16	33	54	49	56
Polio	1	0	1	0	0	0	0	0	1
Yellow fever	0	0	0	0	0	0	0	0	0
Malaria	3	0	4	0	0	1	3	4	5
Schistosomiasis	0	0	0	0	0	0	0	0	0
Intestinal parasites	3	0	3	0	1	2	7	4	3
Other infectious	56	24	69	3	59	26	50	35	88
Neoplasms	103	117	92	125	97	91	86	92	93
Circulatory	280	298	255	260	381	272	328	297	237
Ischemic heart	84	119	55	99	164	69	85	82	46
Cerebrovascular	81	74	84	59	106	57	74	68	91
Other cardiovascular	78	78	73	75	86	97	119	103	59
Diabetes	11	8	12	9	5	20	20	18	10
Certain degenerative	26	19	30	17	21	29	30	26	30
Pregnancy	5	1	6	0	2	3	11	7	5
Perinatal	69	20	77	12	32	48	89	76	79
Injury, poisoning	77	56	83	51	67	64	71	61	94
Other	205	123	248	87	189	223	377	288	219
Mental disorders	2	2	2	2	2	2	2	1	2
Oral health diseases	0	0	0	0	0	0	0	0	0
Micronutrient	5	3	6	2	4	7	12	9	5
Malnutrition	8	3	9	0	6	6	11	8	9
Unspecified	190	115	231	83	177	209	352	269	202

Note: Rates are standardized using the 1985 world age structure.

acute respiratory infections and diarrhea combined account for three-fourths of deaths under five.

Among circulatory system diseases, ischemic heart disease, cerebrovascular disease, and other cardiovascular diseases are nearly equal in importance for the world as a whole. Regionally, ischemic heart disease is responsible for the largest share of circulatory system disease deaths in developed regions; cerebrovascular disease has the largest share in Asia; and other cardiovascular diseases have the largest share in the remaining developing regions. All these categories are important everywhere, however: each always accounts for a fifth or more of the deaths under the major category. Diabetes is of lesser importance in these estimates, with less than 5 percent of deaths under the major category, and nephritis, cirrhosis of the liver, and ulcers of the stomach and duodenum account for roughly twice this proportion.

For the other causes category, an attempt was made to distinguish mental disorders, oral health diseases, micronutrient deficiencies, and malnutrition. Combined these accounted for under 10 percent of other causes, however, leaving a large remainder unspecified.

Experts were asked to comment on the regression estimates. For some causes, they provided their own assessments or suggested useful data. Mainly they recommended increases in deaths from particular causes of 130 to 270 percent. The largest of these increases was for malaria, and progressively smaller increases were recommended for yellow fever, polio, schistosomiasis, and complications of pregnancy (Table 5). For diabetes, a reduction of 6 percent was recommended. For diarrhea, a proportionally trivial reduction was recommended, but with a substantial shift in deaths toward younger ages. On the order of 700 thousand deaths could be moved, per the expert assessments, from over age five to under age five. Although the recommended change in the total number of deaths from all these causes combined is modest, substantial shifts do occur for particular age groups.

Could the regression estimates be too low because all causes of death are underreported? This cannot be the explanation for the discrepancies in Table 5 because the regression estimates have been adjusted to provide the correct overall mortality levels.

If deaths from ill-defined causes were reclassified under other headings, could the regression estimates be raised to the level of the expert assessments? The answer depends on how the ill-defined deaths are redistributed. If they are simply redistributed proportionally across all other categories, each category would increase only about 10 percent, well below the increase required to match the expert assessments. On the other hand, the ill-defined deaths might be assigned to only a few categories, on the assumption that the accuracy of reporting varies. We estimated the maximum number of deaths in each category if as many of the ill-defined deaths as possible were included in it. (These maximum estimates are not consistent, since they add up to substantially

Table 5. Comparison of regression estimates of mortality rates and deaths from particular causes and expert assessments, all developing countries, 1985

	Rates per 100,000		*Deaths (000)*			*Ratio:*	*Recommend-*
Cause	*Regres-sion*	*Expert*	*Regres-sion*	*Maxi-mum*	*Expert*	*Regression/ Expert*	*ed change in deaths (000)*
Diarrhea	81.2	78.4	2977	na	2876	1.0	-101
Polio	0.7	2.1	25	143	77	3.1	52
Yellow fever	0.2	0.7	8	54	26	3.3	18
Malaria	4.0	14.6	146	557	537	3.7	390
Schistosomiasis	0.3	0.9	12	92	34	2.9	22
Pregnancy	5.9	13.4	218	403	492	2.3	274
Diabetes	9.5	8.7	348	na	319	0.9	-29

na = not applicable.
Note: Maximum deaths are obtained by adding to the initial estimates all possible deaths from ill-defined causes.

more than the total deaths.) The column of maximum estimates in Table 5 shows the results. In principle, the expert assessments could be attained if substantial numbers of deaths from ill-defined causes were reclassified under these specific categories. This does not hold in one case: for pregnancy complications, the number of ill-defined deaths among women 15–44 is too small to allow the regression estimates to be adjusted upward sufficiently. In this case, the expert assessments could be correct only if deaths from complications of pregnancy are misclassified under other defined causes.

This does not establish that the expert assessments are correct—it merely shows one way most of them could be made consistent with the WHO database. Essentially the assessments were based on estimates of numbers of cases, whether from survey data or from informed judgments. Different sources of error are attached to reports of cause of death and to estimates from surveys focusing mainly on morbidity. Surveys may allow greater care in identifying cases, but typically often require additional assumptions, generally from inadequate data, about case-fatality rates. Therefore, choosing between the regression estimates and the expert assessments is difficult, and details of each are provided separately—the latter in Annex C, which discusses them further.

Trends in major causes of death

Given uncertainties in figures for specific causes, only the major causes are projected into the future. Figures 4 and 5 shows how the actual numbers of deaths are expected to change for developed and developing countries. The two most important major causes show opposite trends, infectious diseases declining from causing 35 percent of deaths in 1970 to causing 16 percent of deaths in 2015, while diseases of the circulatory system rise, from causing 24 percent of deaths in 1970 to causing 39 percent of deaths in 2015. The infectious disease trend is mainly due to lower mortality from this cause in developing countries, whereas the circulatory disease trend is due to higher mortality from this cause in both developed and developing countries. A

Figure 4. Deaths by cause, developed countries, 1970-2015

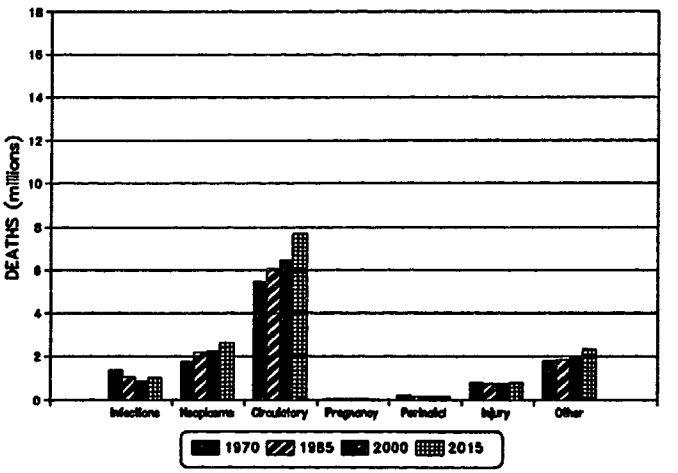
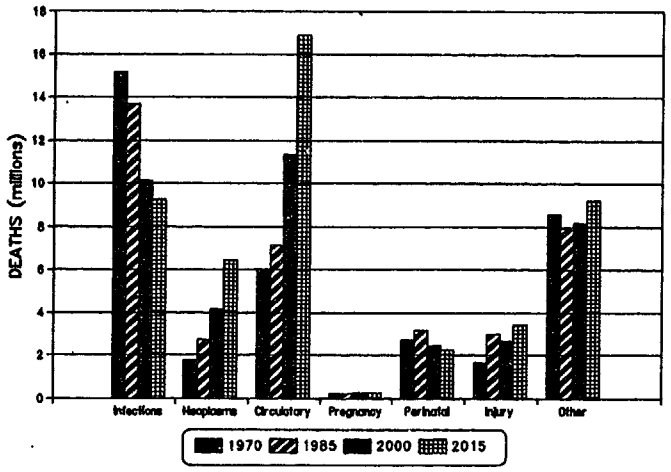


Figure 5. Deaths by cause, developing countries, 1970-2015



convenient index for summarizing these changes is the ratio of deaths from circulatory system diseases to deaths from infectious and parasitic diseases. For the world as a whole, this ratio is estimated at 0.7 for 1970, 0.9 for 1985, 1.6 for 2000, and 2.4 for 2015.

Of the remaining five major causes of death, two follow the trends for these first two causes, certain perinatal conditions showing a decline parallel decline to that for infectious and parasitic diseases and neoplasms showing an increase parallel to that for circulatory system diseases. The other causes category is responsible for more deaths than either of these causes and is expected to decline, but somewhat gradually, and possibly because of better reporting rather than actual change. Injury and poisoning, accounting for 5 to 10 percent of deaths, and complications of pregnancy, accounting for under 1 percent of deaths, show no clear trend.

All regions exhibit the same basic trends, the differences among them having to do mainly with being more or less advanced in the process of epidemiological transition. Patterns and trends for Asia, the region with the largest population, are closest to those for the world as a whole, with Latin America and the Caribbean, industrial nonmarket economies, and industrial market economies successively more advanced, on the one hand, and the Middle East and North Africa and Sub-Saharan Africa successively less advanced, on the other. Table 6 gives the ratios of circulatory system deaths to infectious and parasitic disease deaths, which effectively summarize the regional contrasts.

The greatest numbers of deaths will continue to be in Asia, where almost half of all deaths in the world take place. This proportion is not projected to change. For all causes combined, in fact, each region will contribute about the same proportion of deaths in 2015 as in 1985. For particular causes, some changes are projected, however, with Asia contributing smaller proportions of deaths from infectious and parasitic diseases and perinatal conditions and larger proportions of deaths from circulatory system diseases and neoplasms. Sub-Saharan African deaths will increase in proportion for the first two of these causes, and industrial market economy deaths will decrease

Table 6. Ratio of deaths from circulatory system diseases to deaths from infectious and parasitic diseases, by region, 1970–2015

Region	*1970*	*1985*	*2000*	*2015*
World	0.69	0.89	1.62	2.39
Developed countries	3.98	5.73	7.52	7.69
Developing countries	0.40	0.52	1.12	1.82
Industrial market	5.63	6.64	9.61	11.88
Industrial nonmarket	2.44	4.72	5.24	4.41
Latin America and Caribbean	0.68	1.09	2.46	4.74
Sub-Saharan Africa	0.23	0.27	0.38	0.54
Middle East and North Africa	0.37	0.41	0.81	1.26
Asia	0.42	0.60	1.55	2.75
India	0.40	0.29	1.01	1.64
China	0.53	1.19	3.52	8.37
Other Asia	0.32	0.56	1.04	1.69

in proportion for the last two of these causes.

The projections of mortality by cause are not straightforward extrapolations from past experience, but involve a combination of population projections with predictive equations for mortality rates by cause. An alternative, much simpler, procedure would have been to take the change in percentage of deaths due to a given cause from 1970 to 1985 and extrapolate this linearly into the future. This alternative procedure would have given quite different results: for the world as a whole by 2000, a larger share of deaths due to infectious and parasitic diseases (24 instead of 21 percent), a correspondingly lower share due to circulatory system diseases (29 instead of 35 percent), and smaller variations for the other causes. For specific regions, the differences would have been greater: for the Middle East and North Africa by 2015, for instance, a linear extrapolation would give 39 percent of deaths due to infectious and parasitic diseases, whereas the regression-based procedures give only 23 percent.

Some insight into why the calculations come out as they do can be obtained by decomposing future changes in the distribution of deaths. Such changes may be related to changes in the age-sex structure of the population, changes in mortality levels from all causes within age-sex groups, or changes in the distribution of deaths by cause within age-sex groups. Projections with fixed mortality or fixed distributions of deaths by cause can help distinguish these components of change, if one accepts the necessary assumptions: for instance, that mortality can change without a simultaneous change in the distribution of deaths by cause, or, in other words, that a similar proportional change in deaths across causes is conceivable. Table 7 shows, first, the percentage of deaths due to each cause in 1985; second, the projected increase or decrease in this percentage (by 2000 and 2015) due to contemplated changes in the age-sex structure, assuming fixed mortality; third, the further projected increase or decrease in this percentage if mortality is allowed to decline but the distribution of deaths by cause is fixed within age-sex groups; and fourth, the further projected increase or decrease due to changes in the distribution of deaths by cause within age-sex groups. Totaling the components for 2000 for any given cause and adding the 1985 figure gives the projected percentage of deaths due to that cause by 2000.

Table 7. Percentage distribution of deaths by major cause in 1985 and incremental changes expected by 2000 and 2015 from three factors, world and developed and developing countries

Region and cause	1985 percentage distribution	Percentage point change by 2000 due to			Percentage point change by 2015 due to		
		Age-sex structure	Mortality change	Distribution change	Age-sex structure	Mortality change	Distribution change
World							
Infections	29.6	-1.1	-2.0	-5.2	-1.4	-3.3	-8.4
Neoplasms	9.8	0.6	0.8	1.1	1.1	1.1	2.6
Circulatory	26.5	2.2	2.9	2.9	3.3	4.4	5.3
Pregnancy	0.5	0.1	-0.1	0.0	0.1	-0.2	0.0
Perinatal	6.7	-0.8	-1.2	0.3	-1.8	-1.6	0.6
Injury	7.4	-0.8	-0.4	0.4	-1.1	-0.7	1.1
Other	19.6	-0.3	0.0	0.4	-0.1	0.2	-1.2
Developed Countries							
Infections	8.8	-1.1	-0.2	-0.6	-1.1	-0.2	-0.6
Neoplasms	18.2	0.6	0.0	-0.9	0.8	-0.2	-0.7
Circulatory	50.4	2.5	1.1	-1.8	2.8	1.5	-1.8
Pregnancy	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Perinatal	1.2	-0.3	-0.2	0.4	-0.4	-0.2	0.3
Injury	6.1	-0.5	-0.6	0.9	-0.9	-0.8	1.0
Other	15.3	-1.2	-0.1	2.0	-1.2	-0.1	1.9
Developing Countries							
Infections	36.2	-1.9	-1.8	-6.6	-3.0	-3.0	-10.8
Neoplasms	7.2	1.0	0.7	1.7	1.8	1.0	3.6
Circulatory	18.8	3.2	2.6	4.3	5.2	3.9	7.4
Pregnancy	0.6	0.1	-0.1	0.0	0.1	-0.2	0.0
Perinatal	8.4	-1.1	-1.3	0.3	-2.6	-1.8	0.7
Injury	7.8	-0.9	-0.3	0.2	-1.2	-0.6	1.1
Other	21.0	-0.3	0.2	-0.1	-0.2	0.6	-2.1

Table 7 indicates that the three components can operate in the same or in opposite directions. For instance, population aging, lower mortality (especially at younger ages), and changes in the distribution of deaths all contribute to the decline in infectious diseases. On the other hand, population aging and lower mortality reduce the importance of injury and poisoning, but distribution change raises their importance in relation to other causes of death.

Which of the three components exerts the greatest effect varies considerably from cause to cause. The largest effect overall is that of distributional change on infectious and parasitic diseases, but in this case the other two components mostly operate in the same direction, namely to reduce the proportion of deaths from this cause. The three components are also consistent in their effect on raising the importance of circulatory system diseases in developing countries, but in developed countries the components work in opposite directions. Therefore, both demographic and epidemiological change will have roles in modifying mortality by cause in the future.

Age-sex specific patterns

Patterns by age and sex are roughly similar across regions, but also different in many details. (Annex B gives all the estimates.) Between men and women, differences are small, except with regard to complications of pregnancy. Across ages, mortality is lowest at 5–14 and 15–44, about five times as high at 1–4 and 45–64, and about fifty times as high at 0 and 64 and above. Concerning the percentage of deaths from each cause at each age, the patterns are roughly as follows. Infectious and parasitic diseases decline in importance with age (though they are more prominent at age 1–4 than at 0, give the predominance of certain perinatal causes among infant deaths), whereas circulatory system diseases and neoplasms increase in importance with age. Other causes are essentially stable across ages. Injury and poisoning is most prominent at age 15–44, perinatal conditions of course significant at age 0, and complications of pregnancy notable at age 15–44.

Over time, mortality rates by cause show variable changes. For infectious and parasitic diseases and for the other causes category, reductions are fairly constant across age groups, except for being somewhat smaller at 65 and above. In contrast, for circulatory system diseases and for injury and poisoning, reductions over time are strongly linked to age, being much greater at younger ages. For neoplasms, increases over time are actually more frequent than reductions, and are expected to occur in all regions, but most notably in Sub-Saharan Africa.

To obtain the previously reported estimates for all ages, deaths were simply added up across age groups. Should deaths at different ages be given equal weight? Several arguments to the contrary are possible. For instance, fewer deaths at the oldest ages are likely to be "premature" than at younger ages, and from the perspective of prevention, deaths at the oldest ages might therefore deserve less attention. Also, deaths at younger rather than older ages might be seen as depriving individuals of a larger number of potential years of life. To illustrate the effects of alternative weightings, Table 8 compares the percentage distribution of deaths by cause with the percentage distribution of deaths under 65 and with the percentage distribution across causes of potential years of life lost by death. Years lost are calculated under the simplifying assumptions that life expectancy is 75 and that deaths in each age group from each cause occur at the mean for that age group from all causes in the world as a whole in 1985.

Weighting deaths at younger ages more heavily increases the prominence of infectious and parasitic diseases, perinatal conditions, and injury and poisoning (the latter mainly in developed countries) and reduces the prominence of circulatory system diseases and neoplasms. The effects on the remaining causes are weak or inconsistent. Thus infectious and parasitic diseases account for a little over a third of deaths in developing countries in 1985 but a half of all potential years of life lost. In comparison to infectious and parasitic diseases, circulatory system diseases will account for more deaths by 2000, but not for as many deaths under 65 until 2015, and even by 2015 for less than half as many potential years of life lost. Nevertheless, whether weighted or unweighted, the percentages mostly show similar trends, especially in decreases for infectious and parasitic diseases and increases for circulatory system diseases.

Table 8. Percentage distribution by major cause of all deaths, deaths under 65, and potential years of life lost, world and developed and developing countries, 1970–2015

Region and cause	1970: Percent of All deaths	1970: Percent of Deaths under 65	1970: Percent of Life years lost	1985: Percent of All deaths	1985: Percent of Deaths under 65	1985: Percent of Life years lost	2000: Percent of All deaths	2000: Percent of Deaths under 65	2000: Percent of Life years lost	2015: Percent of All deaths	2015: Percent of Deaths under 65	2015: Percent of Life years lost
World												
Infectious	35	45	50	30	39	44	21	30	37	16	23	32
Neoplasms	7	5	2	10	8	4	12	12	6	15	15	9
Circulatory	24	12	6	26	13	7	35	20	10	39	25	14
Pregnancy	1	1	1	0	1	1	1	1	1	0	1	1
Perinatal	6	9	12	7	11	15	5	10	16	4	9	15
Injury	5	7	6	7	10	10	7	10	9	7	12	11
Other	22	21	23	20	19	20	20	17	20	19	16	18
Developed Countries												
Infectious	12	16	20	9	13	18	7	4	5	7	3	3
Neoplasms	16	18	12	18	21	14	18	27	21	18	29	24
Circulatory	48	28	16	50	29	17	52	39	29	53	41	32
Pregnancy	0	0	0	0	0	0	0	0	0	0	0	0
Perinatal	2	6	11	1	4	8	1	5	14	1	5	14
Injury	7	17	21	6	15	17	6	16	20	5	15	19
Other	16	16	20	15	19	25	16	9	10	16	7	9
Developing Countries												
Infectious	42	49	53	36	42	46	26	33	39	19	26	34
Neoplasms	5	4	2	7	6	3	11	10	5	14	14	8
Circulatory	17	10	5	19	11	6	29	17	9	35	23	13
Pregnancy	1	1	1	1	1	1	1	1	1	1	1	1
Perinatal	7	10	12	8	12	16	6	10	16	5	9	16
Injury	5	5	4	8	10	9	7	10	9	7	11	10
Other	24	22	23	21	19	20	21	18	20	19	17	19

Discussion

Since the expert assessments imply that at least some of the regression estimates are too low, we now consider the quality of these estimates and the biases that may exist in them.

The source of particular estimates should be borne in mind. For several regions, the current and past estimates are based substantially on data reported to WHO. Table 9 shows the proportions of regional populations covered by reported data. (The U.S.S.R. is not counted as covered, but China and rural India are.) The 1970 and 1985 estimates for industrial market economies are drawn almost entirely from reports. This is true to a lesser extent for Latin America and the Caribbean and industrial nonmarket economies. The situation for Asian data is more ambiguous because of reliance on special survey data for China and India. For Sub-Saharan Africa and North Africa and the Middle East, on the other hand, practically all the 1970 and 1985 figures are produced from the regression models.

As noted earlier, estimates based entirely on reports to WHO are not free from potential bias. The general issues of reliability and comparability have already been noted, but in addition some aspects of the coding appear not to conform with expert

Table 9. Percentage of regional population covered by reports to WHO or sample surveys, by year

Region	*1970*	*1985*
World	28	59
Developed countries	74	76
Developing countries	10	53
Industrial market economies	98	100
Industrial nonmarket economies	29	32
Latin America and Caribbean	62	53
Sub-Saharan Africa	0	0
Middle East and North Africa	14	2
Asia	2	71

Note: For 1985, the U.S.S.R. is not counted as covered. China and rural India in 1985 are the only cases covered by sample surveys rather than registration. Urban India is not counted as covered.

expectations. For example, substantial deaths from diarrhea at older ages were judged improbable. Nevertheless, on the average across reporting countries in 1985, 40 percent of all deaths from this cause occurred at age 65 and older, and the proportion exceeded 80 percent in countries like Norway and Japan, with presumably reliable reports. Misclassification cannot be excluded as an explanation, but cannot be confirmed with available data.

Further potential problems exist with the regression-based estimates, where they are used for 1970 and 1985 for countries with no reported data, as well as for 2000 and 2015 for all countries. Both statistical and substantive criteria could be applied in assessing these results.

Statistically, the equations for major causes of death produced patterns for 1970 and 1985 consistent with those produced by Hakulinen and others (1986a) for 1980, using the same equations but different life tables and regional groupings. Hakulinen and others argued that their results had many similarities to previous results by Preston (1976), who estimated equations that were not age-specific. They also argued that the procedure was insensitive to choice of life tables, which appears borne out by the similarities between their results and these.

To assess the regression procedure, the equations were applied to the reporting countries for 1985 to see whether predictions would match reports. This comparison is permissible because the equations for major causes had been separately estimated (by Hakulinen and others) with other data; the procedure is less informative regarding the equations for specific causes, which were estimated using the reported data in the comparison. Table 10 shows, however, that the reported distribution by major causes is more closely approximated by predictions than is the distribution by specific causes. For the major causes, indices of dissimilarity between percentage distributions range from 5 to 13 among the four regions in Table 10. For specific causes under infectious diseases, these indices range from 12 to 34; for specific causes under circulatory system

Table 10. Predicted and reported percentage distributions of deaths by cause for reporting countries grouped by region, 1985

Cause	Industrial (24)[a]		Nonmarket (8)		LAC (26)		Asia (7)	
	Predicted	*Reported*	*Predicted*	*Reported*	*Predicted*	*Reported*	*Predicted*	*Reported*
Percent of all causes								
Infections	8	8	20	11	23	20	31	32
Neoplasms	17	22	12	12	11	11	9	9
Circulatory	51	51	38	50	31	32	25	20
Pregnancy	0	0	0	0	0	0	1	1
Perinatal	1	1	2	2	7	7	6	8
Injury	6	6	6	6	7	10	6	11
Other	17	13	22	19	21	b	22	19
Percent of infections								
Diarrhea	7	1	16	3	22	28	25	9
Tuberculosis	4	2	8	5	6	6	5	8
Acute respiratory	42	49	43	30	41	31	43	33
Measles	1	0	2	0	2	1	3	1
COPD	33	45	19	17	16	b	12	16
Polio	0	0	0	0	0	b	0	0
Yellow fever	0	0	0	0	0	0	0	0
Malaria	0	0	1	0	1	0	1	2
Schistosomiasis	0	0	0	0	0	0	0	0
Intestinal parasites	0	0	1	0	1	1	1	1
Other infections	12	4	10	44	12	17	9	31
Percent of circulatory								
Ischemic heart	30	38	29	43	29	28	27	17
Cerebrovascular	24	24	24	28	23	19	23	42
Other cardiovascular	34	29	34	22	34	37	34	23
Diabetes	6	3	6	1	6	8	6	3
Certain degenerative	7	6	7	5	9	13	9	15
Percent of other causes								
Mental disorders	2	4	1	1	1	c	1	1
Oral health diseases	0	0	0	0	0	c	0	0
Micronutrient	3	2	3	3	3	c	3	2
Malnutrition	1	1	2	2	2	c	3	5
Unspecified	94	93	94	94	94	c	93	91

[a]Number of countries included in the comparison.
[b]With no reported data for this category, it was assumed to be equal to the predicted value to permit comparisons for other categories.
[c]No data.

diseases, they range from 8 to 24; and for specific causes under other causes, they range from 1 to 3. Generally, the distributions for nonmarket economies are more poorly predicted than those for other regions.

For particular causes, predicted percentages are higher than reported percentages in some regions, lower in others. For circulatory system diseases, for instance, predictions are too high in Asia, too low in nonmarket economies. One might draw implications from such comparisons about the possible directions of bias in the estimates for nonreporting countries, but only if one assumes similar mortality patterns in nonreporting as in reporting countries.

For the specific causes, the statistical adequacy of the equations varies by cause, as indicated earlier using coefficients of determination. Those causes of death that have distinctive patterns in Africa and the Middle East, and possibly in Asia, may be poorly estimated for these regions. This does not mean that diseases especially prevalent in these regions are underestimated: their prevalence might still be properly represented by extension of patterns across developed and Latin American countries. Rather it means that causes of death that show important discontinuities between reporting countries and nonreporting countries may be poorly estimated for the nonreporting countries. Unfortunately, without reports for all regions, one cannot tell definitively which causes of death these are.

Even if the equations were entirely accurate for the present, projecting them into the future would still raise several issues. Future estimates also depend on assumptions about age structure, about current vital rates, and about trends in these variables. Furthermore, other unexpected changes could alter the outlook. Estimates for new causes of death cannot be generated by this procedure. For Human Immunodeficiency Virus (HIV) infection, in particular, this limitation may have significance for the broader picture. Besides changes in diseases, changes in medical technology, in life styles, in health and safety measures, and in the delivery of health services, as well as in the nature and quality of cause of death reports, could change the picture. All that the projections provide is a hypothetical picture based on somewhat contradictory assumptions: that mortality decline will be extended into the future, extending past trends, but that historical patterns associating particular disease categories with particular mortality levels will remain as they are.

Despite these caveats and uncertainties, the broad patterns in the estimates and projections are certainly plausible: the regional contrasts and the way some of them persist over time; the expected increase in circulatory system diseases as a cause of death; and the separate contributions of age structures, mortality levels, and epidemiological change to variation in distribution of deaths by cause. The implications worth drawing from these broad patterns depend on the questions one asks. As Table 8 showed with alternative percentage distributions, from different perspectives the figures reveal different patterns. One clear implication from any perspective, however, is that better data on cause of death are essential. In this regard, WHO is working with countries to strengthen their cause of death information systems as an essential support for health monitoring.

Annex A. Methodology

This annex provides more detail about the data on causes of death, the projection of mortality levels, and the regressions to decompose overall mortality into major and specific causes. The reclassification of deaths from unspecified causes is also discussed.

Table A1 shows how countries are classified.

Table A1. Regional grouping of countries and territories

Industrial Market Economies
Australia
Austria
Belgium
Canada
Channel Islands
Cyprus
Denmark
Finland
France
Germany, Fed. Rep. of
Greece
Iceland
Ireland
Italy
Japan
Luxembourg
Malta
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States of America
Other Europe
Other North America

Industrial Nonmarket Economies
Albania
Bulgaria
Czechoslovakia
German Dem. Rep.
Hungary
Poland
Romania
U.S.S.R.
Yugoslavia

Latin America and the Caribbean
Antigua and Barbuda
Argentina
Bahamas
Barbados
Belize
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Rep.
Ecuador
El Salvador
Grenada
Guadeloupe
Guatemala
Guyana
Haiti
Honduras
Jamaica
Martinique
Mexico
Montserrat
Netherlands Antilles
Nicaragua
Panama
Paraguay
Peru
Puerto Rico
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenadines
Suriname
Trinidad and Tobago
Uruguay
Venezuela
Virgin Islands (U.S.)
Other Latin America

Sub-Saharan Africa
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Rep.
Chad
Comoros
Congo, People's Rep.of
Côte d'Ivoire
Djibouti
Equatorial Guinea
Ethiopia
Gabon
Gambia, The
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Réunion
Rwanda
Saõ Tomé and Principe
Senegal
Seychelles
Sierra Leone
Somalia
South Africa
Sudan
Swaziland
Tanzania
Togo
Uganda
Zaire
Zambia
Zimbabwe
Other West Africa

Middle East and North Africa
Afghanistan
Algeria
Bahrain
Egypt, Arab Rep. of
Gaza Strip
Iran, Islamic Rep. of
Iraq
Israel
Jordan
Kuwait
Lebanon
Libya
Morocco
Oman
Pakistan
Qatar
Saudi Arabia
Syrian Arab Rep.
Tunisia
Turkey
United Arab Emirates
West Bank
Yemen, People's Dem. Rep. of
Yemen Arab Rep.
Other North Africa

Asia and the Pacific
Bangladesh
Bhutan
Brunei
Cambodia
China (excluding Taiwan)
Fiji
French Polynesia
Guam
Hong Kong
India
Indonesia
Kiribati
Korea, Dem. People's Rep. of
Korea, Rep. of
Lao People's Dem. Rep.
Macao
Malaysia
Maldives
Mongolia
Myanma
Nepal
New Caledonia
Pacific Islands
Papua New Guinea
Philippines
Singapore
Solomon Islands
Sri Lanka
Taiwan
Thailand
Tonga
Vanuatu
Viet Nam
Western Samoa
Other Micronesia
Other Polynesia

Data on causes of death

The cause of death data for countries and territories used in this analysis can be divided into two groups. Table A2 lists those countries, mostly developed, for which the cause of death data are reasonably reliable, although comparability may still be uncertain. Table A3 lists those countries for which the data are less reliable and presents two indicators of reliability: coverage, as computed from the annual estimated number of deaths, and quality, as measured by the proportion of deaths coded as due to ill-defined conditions. Some countries that report data have been excluded because coverage and quality are sufficiently poor to render the data unusable.

Of the countries included, China, India, and the U.S.S.R. have data with special characteristics. The Chinese data are from a survey covering 57 million urban residents and 42 million rural residents spread over the eastern part of the country. The 580 thousand deaths recorded, though only 7 percent of estimated annual Chinese deaths, should be reasonably indicative of the mortality pattern for 70-80 percent of the population. ICD-9 codes were used, and all the major causes and the majority of specific causes can be identified. Sample deaths were weighted to reflect the total population.

The Indian data are from a 1986 cause of death survey of 1,200 rural primary health care centers spread throughout India, and covered 10,075 male and 8,187 female deaths (0.2 percent of estimated Indian deaths). Coding was idiosyncratic, but the major causes and some of the specific causes were still distinguishable. Without the base population, mortality rates could not be calculated from the survey. We arbitrarily assumed that age-specific urban mortality rates were fixed percentages of rural rates (at age 1-4, 37.5 percent; at ages 0, 5-14, and 15-44, 67 percent; at age 45-65, 75 percent; and at age 65 and above, 100 percent). With the rural population at 74.5 percent of the total and with a particular age structure of mortality for the country as a whole drawn from Bank projections (see below), we then generalized the survey results to cover the rural population and estimated urban deaths by cause from the regression equations discussed below.

For the U.S.S.R., the data reported to WHO permitted identification of deaths due to diarrhea, most circulatory system diseases (excluding cirrhosis of the liver) and measles. Regression estimates were used to fill in the other causes.

For most other countries, data were available on each cause of death. The major exceptions were the Latin America and Caribbean countries, for which 1970 but not 1985 data were available on other causes and four specific causes (chronic obstructive pulmonary disease, polio, mental disorders, and micronutrient disorders). Again, regression estimates filled in for the missing data.

Projecting mortality

As noted above, the projection of mortality involved separate projections of life expectancy and infant mortality and the selection of "split" life tables.

Table A2. Countries or terrritories with reliable reports on causes of death, and year of data used, by region

Country or territory	*Year*	*Country or territory*	*Year*
Industrial market economies		*Industrial nonmarket economies*	
Australia	1985	Bulgaria	1985
Austria	1985	Czechoslovakia	1985
Belgium	1986	German Dem. Rep.	1985
Canada	1985	Hungary	1985
Denmark	1985	Poland	1985
Finland	1985	Romania	1984
France	1985	U.S.S.R.	1986
Germany, Federal Rep. of	1985	Yugoslavia	1985
Greece	1985		
Iceland	1985	*Latin America and the Caribbean*	
Ireland	1985	Argentina	1985
Italy	1985	Chile	1985
Japan	1985	Costa Rica	1985
Luxembourg	1985	Cuba	1985
Malta	1985	Uruguay	1985
Netherlands	1985		
New Zealand	1985	*Middle East and North Africa*	
Norway	1985	Israel	1985
Portugal	1985		
Spain	1985	*Asia*	
Sweden	1985	Hong Kong	1985
Switzerland	1985	Singapore	1985
United Kingdom	1985		
United States of America	1985		

Note: Data for around 1970 for all these countries or territories except the German Democratic Republic, the U.S.S.R., and Israel were also used. The U.S.S.R. data, though considered reliable, could not provide estimates for many of the specific causes used here.

Life expectancy is assumed to rise over time following a logistic curve that has a minimum of 20 and a maximum of 75.8 for males or 82.5 for females. The slope of the curve is estimated using a regression equation that has on the right-hand side the slope over the previous quinquennium and the female secondary enrolment ratio (or the percent urban, in the few cases where this is not available). In comparisons among a variety of countries, the median slope in the past, applying the logistic curve, was -.035, and the quartiles were -.017 and -.053. To eliminate extreme trends—including a few increases in mortality—no country is allowed to have a slope falling outside these quartiles. The estimated slope, or the quartile value if appropriate, is assumed to apply for three quinquennia, after which all countries are assumed to revert to the median slope.

Infant mortality is assumed to fall over time also following a logistic curve, from a maximum of 200 per thousand to a minimum of 4 per thousand. The median slope across a variety of countries with data was .052, with the quartiles being .025 and .120. A slope is estimated for each country from its performance in the preceding quinquennium, and applied for three quinquennia, unless this slope falls outside the quartiles, in which case the appropriate quartile value is used.

Table A3. Countries or territories with less reliable reports on causes of death, year of data used, and indices of coverage and data quality, by region

Country or territory	*Year of data used*	*Reported deaths*		
		Number	*Percent of estimated total deaths*	*Percent due to ill-defined conditions*
Latin America and the Caribbean				
Antigua and Barbuda	1983	300	na	na
Bahamas	1985	1200	na	<5
Barbados	1984	2000	95	<5
Belize	1984	700	na	15
Dominica	1984	400	na	na
Dominican Rep.	1985	28000	62	15
Ecuador	1985	51000	70	15
El Salvador	1984	29000	62	20–25
Guatemala	1984	66500	86	10
Guyana	1984	4800	91	10
Martinique	1985	2200	88	10
Mexico	1983	410000	85	5
Panama	1985	9000	80	5–10
Paraguay	1985	12600	50	20–25
Peru	1983	94000	50	5–10
Puerto Rico	1985	23200	100	<5
St. Kitts and Nevis	1984	500	na	15
St. Vincent and the Grenadines	1985	700	na	10
Suriname	1985	2300	95	15
Trinidad and Tobago	1983	7600	95	<5
Venezuela	1983	77000	81	5
Sub-Saharan Africa				
Mauritius	1985	6600	100	<5
Saõ Tomé and Principe	1985	1100	na	20
Seychelles	1985	500	na	10
Middle East and North Africa				
Bahrain	1985	1600	90	20
Kuwait	1985	4300	85	5
Asia				
China	1985	580000	7	<5
India	1986	18000	0.2	na
Korea, Rep. of	1985	192000	75	15
Sri Lanka	1983	96000	96	30
Thailand	1985	218000	57	50

na = not ascertained.

Note: Data for around 1970 were also used for these countries except for Guyana, Seychelles, Sao Tome, Bahrain, Israel, China, India, the Republic of Korea, and Sri Lanka. In addition, 1970 data were used for five additional countries: Colombia, the Arab Republic of Egypt, Honduras, Nicaragua, and St. Lucia. The quality indices, in ten cases, are for a later data year, either 1986 or 1987. The data used for China and India were sample survey data.

For each country for the first three quinquennia, life tables are chosen from the Coale-Demeny set. The first step is to select that family of life tables (North, South, East, or West) for which the ratio of life expectancy to infant mortality is as close as

possible to the ratio for that country. The second step is to make up composite or "split" life tables from life tables for different levels of the selected family: the infant mortality rate is used to select levels to apply up to age 14, and the life expectancies are used in conjunction with the first selection to select levels to apply from age 15 on. By the thirteenth quinquennium, all countries are assumed to have reverted to West model life tables, with levels chosen according to the median trend in life expectancies and infant mortality determined entirely by the choice of levels. Between the third and the thirteenth quinquennium, life tables are interpolated to provide a smooth transition.

Single-year deaths by age and sex are obtained by interpolation from the quinquennial estimates normally provided in the projections, taking migration into account.

For more detail and justification of these procedures, a background paper on the World Bank projection procedures (Bulatao and Bos 1989) can be consulted.

Predicting deaths by major cause

The equations for major causes of death show mortality rates by cause increasing with overall mortality for all causes except neoplasms. The increases are greatest for infectious and parasitic diseases (slopes around 0.5, meaning that half of an increase in deaths is attributable to this major cause), followed by other and unknown causes (slopes around 0.25) and perinatal conditions (slope of 0.22, for age group 0 only). Slopes vary considerably by age group: for infectious and parasitic diseases, they vary from 0.7 for those 1–4 years old to 0.4 for those 65 and older. Slopes also vary by sex: for neoplasms among those 65 and older, the slope for males is -0.13 and for females -0.04. Nevertheless, the trend across age groups is essentially similar between males and females. In contrast, slopes vary very little across regions, with the largest gap between regions for a given cause and sex and age group being around 0.04. The equations for lower-mortality, more developed regions do appear to diverge more often from the norm, though only minimally. Considering the number of regions and the rarity of even small differences in the equations, the case for distinct cause of death structures across regions is weak.

Where reported data were not available, the equations specific to each of the 24 regions were applied (though the world equations would produce similar results). For 2000 and 2015, we maintained the same region-specific equations for the industrial market economies but allowed each other country to switch from its region-specific set of equations to the equations for developed countries as a whole if its mortality level had declined sufficiently, as indicated by a crude death rate, standardized using the 1985 age structure for the world as a whole, below 6. (The industrial market economies as a group have a standardized crude death rate of 5.8, as contrasted, for example, with 9.0 for Latin America and the Caribbean.)

The few negative estimates of mortality rates (e.g., because of the negative slopes for neoplasms) were set to zero case by case, and rates for other disease categories adjusted proportionally.

Estimating deaths by specific cause

To estimate new regressions for 22 specific causes of death, data for around 1970 and around 1985 were pooled. As noted earlier, Latin America and Caribbean countries had no data for some causes for 1985, requiring the inclusion of 1970 data. Altogether, 1970 data for 65 countries (34 of them developing, mostly Latin American) and 1985 data for 69 countries (38 developing) were used. Because of the number of causes for which estimates could not be produced, the U.S.S.R. and India were excluded, but China was included. Data quality varies for the countries included, but imposing a more rigorous standard would bias the sample strongly toward developed countries.

For each country, mortality rates by cause were first adjusted to correspond to overall mortality levels in the World Bank estimates and projections. Rates based on fewer than 10,000 people in the age-sex group were excluded. Three equations were then estimated for each disease in each age-sex group: a quadratic specification, where the rate for the specific cause depended on the rate for the major cause and the square of this rate, as well as on a dummy variable for data year; a corresponding linear specification; and a specification in which the rate for the specific cause depended only on two dummy variables, for developing country status and data year.

If the quadratic term achieved a 5 percent level of significance, the quadratic equation was chosen; if not, and the linear term achieved a 5 percent level of significance, the linear equation was chosen; and in all remaining cases, the dummy variable equation was chosen. Of the 264 final equations, half were quadratic, a third linear, and the remainder dummy variable equations. The dummy variable for data year had a significant effect in 20 percent of the equations chosen.

Mortality rates for some specific causes of death were predicted better than rates for others. R^2 did vary much more by cause than by age-sex group, permitting the grouping of equations by cause:

a. mean R^2 over .70: diarrhea, acute respiratory infection, other cardiovascular diseases, and unspecified causes
b. mean R^2 between .35 and .60: tuberculosis, measles, chronic obstructive pulmonary disease, other infectious and parasitic diseases, cerebrovascular disease, nephritis/cirrhosis/ulcers, micronutrient disorders, and malnutrition
c. mean R^2 between .20 and .25: intestinal parasites, ischemic heart disease, and diabetes
d. mean R^2 below .20: polio, malaria, yellow fever/dengue/encephalitis, schistosomiasis/filariasis, mental disorders, and oral health diseases.

The last group also accounted for almost all the dummy variable equations. Mortality rates for causes in this group did not covary with mortality levels for broader categories, and developed or developing country averages were essentially applied for these causes.

Reclassifying deaths from unspecified causes

The subcategory of unspecified causes of death includes particular causes that we cannot treat individually—meningitis, appendicitis, kidney infections, congenital anomalies, indirect obstetric causes, etc.—as well as vague and ill-defined conditions. Particularly for developing countries, where ill-defined conditions may be numerous (see the last column in Table A3), it is useful to determine the potential effect of reclassifying these deaths under other categories.

The appropriate procedure would be to use as a guide empirical studies that reclassify under other headings deaths reported as due to ill-defined conditions. Not having located such studies, we propose an alternative requiring no special information. This alternative involves, first, determining the number of such deaths, and second, calculating the maximum potential increase in deaths in every other category from reclassifying deaths from ill-defined conditions.

The deaths in the unspecified causes subcategory set an upper limit on the deaths we need to reclassify. We reduce the number by assuming that mortality rates for this subcategory for developed countries reflect properly diagnosed miscellaneous causes, and that only rates for developing countries that exceed these developed-country rates reflect deaths from ill-defined causes. The latter can thus be estimated for each age-sex group in each developing country region.

These deaths might simply be distributed proportionally across all other cause of death categories. However, we do not wish to exclude the possibility that proportionally more deaths are misdiagnosed for some causes than for others. Therefore, we set a maximum possible increase for each category from reclassifying deaths from ill-defined causes. These maximum increases are determined under two assumptions: that they are proportional to the square root of $p_i (1 - p_i)$, where p_i is the proportion of deaths initially in category i; and that the largest possible maximum increase for any category (by the previous assumption, this would be for a category with exactly half of all deaths) is the total estimated deaths from ill-defined causes.

These maximum potential increases should total more than the ill-defined deaths, and maximum increases for subcategories should total more than the maximum increase for the major category of which they are a part. This is as it should be. The maximum increases only indicate how much larger each category might be, but do not indicate that it should be larger, and not all categories can simultaneously be much larger.

Annex B. Supplementary Tables

The tables in this annex provide demographic parameters by region (B1 and B2); mortality rates and deaths for major causes by age, sex, and region from 1970 to 2015 (B3 and B4); and mortality rates and deaths for specific causes by age, sex, and region for 1985 (B5 and B6). The estimates in the latter two tables are the regression estimates, and have not incorporated expert assessments, which appear in the following annex.

Table B1. Population in millions by age and sex, major world regions, 1970–2015

Region, age and sex	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
World								
Total	1848	1853	2438	2406	3128	3075	3801	3745
0	57	53	62	59	70	68	74	71
1–4	212	201	232	222	271	263	287	278
5–14	434	419	542	516	641	622	691	669
15–44	797	771	1117	1076	1461	1402	1746	1687
45–64	257	276	363	368	500	498	748	738
65+	92	134	122	165	183	224	256	303
Developed								
Total	507	560	570	606	618	645	647	670
0	9	8	9	9	8	8	9	8
1–4	37	35	35	34	33	32	34	32
5–14	98	94	89	85	87	83	84	80
15–44	227	230	266	260	276	268	261	253
45–64	92	116	121	136	146	153	175	180
65+	44	76	51	83	67	100	84	117
Developing								
Total	1341	1293	1868	1800	2510	2430	3154	3075
0	48	45	53	51	62	60	65	63
1–4	174	165	197	189	238	231	253	245
5–14	336	325	453	432	554	539	607	589
15–44	569	541	851	816	1185	1133	1484	1434
45–64	165	160	242	232	355	344	573	558
65+	48	58	72	81	116	123	172	186
Industrial								
Total	334	360	371	389	398	412	411	424
0	6	6	5	5	5	5	5	5
1–4	24	23	20	19	20	19	20	19
5–14	62	59	55	52	52	50	50	47
15–44	146	146	174	171	176	170	160	154
45–64	65	75	79	84	98	101	116	118
65+	32	51	37	57	47	67	60	81
Nonmarket								
Total	173	200	199	217	220	233	236	246
0	3	3	4	4	3	3	4	3
1–4	13	12	15	14	13	13	14	13
5–14	37	35	34	32	35	34	34	33
15–44	81	84	91	89	100	98	101	99
45–64	27	41	43	51	48	52	59	62
65+	12	25	13	27	20	33	24	36
LAC								
Total	142	142	201	201	264	265	319	322
0	5	4	6	6	6	5	6	6
1–4	18	17	22	21	23	22	23	22
5–14	38	37	49	48	57	55	55	53
15–44	59	59	92	91	129	128	156	153
45–64	17	17	24	25	37	40	62	65
65+	6	7	8	10	12	15	18	24

Table B1. Population in millions (continued)

Region, age and sex	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	146	150	226	230	358	362	539	545
0	6	6	9	9	14	14	17	17
1–4	21	21	33	33	49	49	65	64
5–14	39	39	62	62	100	99	142	140
15–44	60	62	93	94	152	153	245	246
45–64	15	16	22	24	34	37	56	60
65+	4	5	6	7	9	11	15	18
MENA								
Total	128	122	193	183	293	280	411	394
0	5	5	7	7	9	9	11	10
1–4	17	17	25	24	35	34	41	39
5–14	35	33	51	47	76	74	94	91
15–44	52	50	84	78	131	123	194	185
45–64	15	14	21	20	32	31	57	53
65+	5	5	6	6	9	10	15	15
Asia								
Total	924	880	1248	1186	1595	1523	1885	1815
0	33	30	31	29	33	32	32	30
1–4	118	110	117	111	131	126	125	121
5–14	225	216	291	274	321	311	316	305
15–44	398	371	583	552	774	730	890	851
45–64	117	112	175	162	251	237	397	380
65+	33	41	52	58	85	87	125	128
India								
Total	286	266	395	370	519	491	631	605
0	10	9	12	11	12	11	11	11
1–4	35	32	45	43	46	45	45	43
5–14	68	65	97	92	113	110	116	112
15–44	123	115	173	161	251	234	310	298
45–64	38	34	53	47	73	70	114	105
65+	11	11	16	16	24	22	35	36
China								
Total	427	402	550	515	669	629	753	714
0	15	14	10	9	12	11	11	10
1–4	54	51	37	35	47	45	43	41
5–14	101	96	117	108	116	112	108	103
15–44	188	167	275	255	324	303	331	313
45–64	55	54	86	77	125	113	195	183
65+	15	22	26	31	46	46	65	63
Other Asia								
Total	211	212	303	301	407	403	502	495
0	8	7	9	9	10	9	10	9
1–4	29	27	35	33	38	37	38	36
5–14	56	56	78	74	92	89	93	90
15–44	87	88	135	136	199	194	249	239
45–64	25	24	36	37	53	54	89	92
65+	7	8	10	12	16	19	24	29

Table B2. Estimates and projections of fertility, mortality, and population growth for major regions in selected quinquennia

Quinquennium and region	*Births*	*Deaths*	*Growth rate (percent)*	*Total fertility rate*	*Life expectancy at birth*		*Mortality*	
	Crude rate per 1000				*Males*	*Females*	*Infant (1000 q0)*	*Under 5 (1000 q5)*
1970–75								
World	31	12	1.9	4.3	60	63	83	122
Developed	16	10	0.7	2.2	69	76	24	28
Developing	37	12	2.4	5.2	57	58	93	138
Industrial	16	10	0.7	2.1	71	78	15	17
Nonmarket	18	11	0.7	2.4	64	73	38	47
LAC	34	9	2.4	4.8	60	65	63	85
Sub-Sahara	48	20	2.8	6.6	43	47	138	231
MENA	42	15	2.7	6.3	52	54	116	169
Asia	35	11	2.3	4.9	59	59	84	119
1985–90								
World	27	10	1.7	3.4	63	67	70	96
Developed	15	10	0.5	1.9	70	77	15	18
Developing	31	10	2.1	3.9	61	63	78	108
Industrial	13	9	0.5	1.7	73	79	9	10
Nonmarket	17	11	0.7	2.3	66	74	24	28
LAC	29	7	2.0	3.6	64	69	56	69
Sub-Sahara	46	15	3.1	6.4	50	53	111	171
MENA	40	10	3.0	5.6	59	61	90	121
Asia	27	9	1.8	3.3	63	65	68	90
2000–05								
World	23	8	1.4	2.9	66	70	50	67
Developed	13	10	0.3	1.9	73	79	11	12
Developing	25	8	1.7	3.1	65	67	55	74
Industrial	12	10	0.3	1.8	75	81	7	7
Nonmarket	15	10	0.4	2.1	70	76	17	20
LAC	21	6	1.4	2.5	68	73	37	44
Sub-Sahara	40	11	2.9	5.4	55	59	83	122
MENA	32	8	2.4	4.3	64	65	56	73
Asia	21	8	1.3	2.6	67	69	45	56
2015–20								
World	20	8	1.1	2.6	68	72	40	53
Developed	13	11	0.2	2.0	73	80	10	11
Developing	21	8	1.3	2.6	67	70	43	58
Industrial	12	11	0.1	2.0	75	81	7	7
Nonmarket	14	11	0.3	2.1	71	78	14	17
LAC	18	7	1.1	2.2	70	75	29	34
Sub-Sahara	32	9	2.3	4.0	59	63	64	93
MENA	26	7	1.9	3.1	66	69	44	57
Asia	17	8	0.9	2.2	69	71	34	42

Table B3. Mortality rates per 100,000 from major causes, by age, sex, and region, 1970–2015

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				All Causes				
World								
Total	1293	1281	1064	1004	863	802	880	776
0	9135	8647	8550	6955	5759	4581	4656	3538
1–4	1730	1845	1380	1291	444	390	362	281
5–14	222	238	165	154	118	103	104	87
15–44	384	346	270	244	222	204	201	172
45–64	1521	1024	1294	904	1097	774	1019	678
65+	7979	6847	7463	6497	6901	6048	6880	5845
Developed								
Total	1054	1069	1047	1013	997	963	1161	1059
0	3477	1417	1920	1379	1392	988	1268	775
1–4	703	681	785	805	53	90	54	75
5–14	72	20	39	17	27	11	25	9
15–44	188	75	181	55	125	41	108	33
45–64	1160	605	1112	517	904	395	882	368
65+	7612	6355	7474	6015	6655	5482	6755	5471
Developing								
Total	1383	1373	1070	1001	830	759	823	714
0	10169	9995	9671	7902	6341	5053	5098	3894
1–4	1952	2097	1486	1378	499	432	403	308
5–14	265	301	189	181	132	118	115	98
15–44	462	461	298	305	245	243	217	197
45–64	1723	1330	1385	1130	1177	942	1061	778
65+	8310	7503	7454	6993	7043	6511	6941	6080
Industrial								
Total	1036	1021	986	950	1007	943	1173	1045
0	2275	890	1222	880	935	671	908	533
1–4	907	957	428	492	46	91	27	54
5–14	44	9	20	6	14	3	15	3
15–44	128	44	112	32	87	23	79	19
45–64	1000	480	926	399	775	298	778	293
65+	7270	5980	7084	5711	6615	5330	6408	5073
Nonmarket								
Total	1089	1155	1162	1126	980	1000	1139	1082
0	5828	2452	2931	2082	2078	1461	1772	1113
1–4	319	162	1291	1239	63	89	92	103
5–14	119	39	70	35	45	22	38	16
15–44	295	128	314	99	191	72	155	55
45–64	1540	831	1455	712	1169	588	1088	513
65+	8551	7111	8593	6661	6748	5786	7606	6372
LAC								
Total	1097	903	883	706	677	557	722	594
0	7886	5789	6365	5050	4244	3322	3370	2466
1–4	1039	918	749	717	314	289	137	109
5–14	173	136	107	82	67	46	55	34
15–44	348	266	246	144	173	99	150	81
45–64	1553	1068	1351	779	1083	605	993	527
65+	8132	7019	7925	6441	7052	5742	6702	5415

Table B3. Mortality rates per 100,000 (continued)

Region	*1970*		*1985*		*2000*		*2015*	
and age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	2163	1882	1727	1448	1196	1024	947	785
0	17653	14573	14128	11476	9935	8003	7557	5856
1–4	2774	2424	2215	1675	1094	852	925	604
5–14	679	683	439	430	306	284	238	211
15–44	838	736	654	564	517	440	406	330
45–64	2202	1746	1995	1537	1691	1315	1444	1061
65+	9108	8382	8589	7738	7905	7114	7461	6516
MENA								
Total	1563	1520	1184	1121	775	733	691	624
0	13275	12850	11330	9237	6589	5278	5150	3978
1–4	1451	1667	1554	1574	370	356	300	305
5–14	306	357	213	206	125	114	105	91
15–44	565	571	295	326	265	296	216	223
45–64	2016	1588	1429	1182	1285	1101	1157	898
65+	8947	8002	7934	7505	7400	6953	7086	6439
Asia								
Total	1280	1342	963	946	784	736	833	734
0	8627	9259	8552	6999	5138	4034	4047	3026
1–4	2017	2287	1402	1374	343	315	215	188
5–14	203	252	146	138	91	78	74	60
15–44	410	431	250	284	201	218	177	173
45–64	1649	1279	1307	1118	1108	920	1004	759
65+	8148	7418	7191	6939	6910	6516	6899	6099
	Infectious and Parasitic Diseases							
World								
Total	449	449	318	294	176	179	140	133
0	3913	3926	3537	2990	2195	1809	1629	1277
1–4	1148	1248	775	735	272	246	215	170
5–14	113	146	78	88	49	54	41	44
15–44	153	166	84	93	57	81	43	60
45–64	332	216	262	195	118	111	71	63
65+	1209	948	1223	928	841	741	772	619
Developed								
Total	146	112	109	74	78	59	90	63
0	953	355	306	234	126	86	66	20
1–4	172	165	274	276	3	31	9	26
5–14	17	4	6	3	1	0	0	0
15–44	29	9	24	2	6	0	0	0
45–64	148	52	85	21	46	0	32	0
65+	885	606	659	366	591	367	629	363
Developing								
Total	564	595	382	368	200	211	150	148
0	4453	4592	4083	3457	2471	2036	1833	1439
1–4	1359	1482	864	817	310	276	242	188
5–14	141	187	92	105	57	62	47	50
15–44	202	233	103	122	69	100	51	70
45–64	436	335	351	297	147	161	84	83
65+	1501	1404	1620	1506	986	1046	842	780

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	106	85	82	66	64	47	68	38
0	341	138	55	39	0	2	0	0
1–4	187	229	37	46	5	33	2	19
5–14	3	1	1	0	0	0	0	0
15–44	6	3	4	1	0	0	0	0
45–64	75	28	43	17	0	0	0	0
65+	736	442	700	412	556	285	477	201
Nonmarket								
Total	224	159	158	88	103	79	128	106
0	2150	781	671	509	315	213	157	48
1–4	143	44	611	594	0	28	19	35
5–14	40	8	13	6	2	0	0	0
15–44	70	20	64	5	16	0	0	0
45–64	319	97	163	26	142	1	95	0
65+	1295	938	544	267	674	531	1002	729
LAC								
Total	366	301	211	177	100	86	67	55
0	3962	2957	2339	2010	1402	1151	952	710
1–4	671	611	390	385	175	172	47	43
5–14	79	72	36	35	15	13	8	6
15–44	99	93	53	40	13	15	7	9
45–64	308	200	206	105	65	24	22	10
65+	1306	1076	1083	847	825	615	670	455
Sub-Sahara								
Total	1070	937	817	683	498	430	346	286
0	8286	6949	6473	5350	4318	3557	3095	2449
1–4	1972	1734	1564	1186	746	584	622	402
5–14	414	456	257	280	170	178	126	127
15–44	466	416	341	306	246	226	170	155
45–64	742	540	617	440	435	335	286	214
65+	1900	1828	1681	1578	1393	1337	1205	1105
MENA								
Total	624	653	459	473	209	237	142	164
0	5806	5856	5034	4194	2599	2152	1859	1481
1–4	973	1147	1081	1111	215	221	164	184
5–14	160	218	109	124	52	60	38	43
15–44	256	285	94	153	74	134	43	86
45–64	584	432	280	277	195	239	116	142
65+	1594	1425	1299	1409	1088	1207	955	1010
Asia								
Total	506	577	319	323	149	176	110	119
0	3603	4164	3465	2960	1852	1509	1291	992
1–4	1410	1623	707	726	196	191	108	104
5–14	101	154	63	75	31	35	21	24
15–44	170	217	75	99	42	83	28	53
45–64	396	314	345	309	114	146	60	66
65+	1472	1404	1736	1620	953	1065	811	767

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Neoplasms				
World								
Total	95	96	108	96	108	98	128	114
0	9	8	11	8	9	9	10	9
1–4	16	18	22	20	9	9	9	9
5–14	7	7	6	6	8	8	8	8
15–44	17	21	20	22	17	20	17	21
45–64	241	216	270	215	251	217	256	219
65+	1055	738	1127	748	1009	721	1039	746
Developed								
Total	167	163	203	172	182	170	213	188
0	10	5	8	8	8	8	8	7
1–4	60	66	31	35	7	9	6	7
5–14	8	4	6	4	6	4	6	3
15–44	18	18	18	17	16	13	15	11
45–64	256	193	296	196	246	178	249	172
65+	1275	831	1503	880	1096	797	1091	800
Developing								
Total	68	68	78	70	90	79	111	98
0	9	8	11	8	10	9	10	9
1–4	7	8	20	18	9	9	9	9
5–14	6	7	6	6	8	9	8	9
15–44	16	22	20	23	17	22	17	23
45–64	233	232	257	226	252	234	257	234
65+	857	614	862	613	958	658	1013	712
Industrial								
Total	186	169	240	192	196	171	236	200
0	10	4	6	6	7	7	7	6
1–4	82	92	45	52	6	8	4	6
5–14	7	2	4	1	4	2	4	2
15–44	16	12	15	10	14	8	13	7
45–64	250	172	309	178	247	153	249	152
65+	1337	882	1679	1030	1109	814	1123	824
Nonmarket								
Total	129	152	136	135	158	169	173	168
0	11	8	10	9	10	9	10	9
1–4	17	16	11	12	9	9	9	10
5–14	10	9	9	8	9	8	8	6
15–44	22	29	25	30	19	22	18	18
45–64	271	232	272	225	244	226	248	211
65+	1103	727	998	560	1067	764	1012	744
LAC								
Total	79	76	76	70	94	86	122	109
0	8	7	9	8	10	9	10	9
1–4	14	12	9	9	10	10	10	9
5–14	6	6	7	7	9	9	9	9
15–44	16	22	15	19	18	20	17	19
45–64	221	222	223	204	265	219	268	210
65+	1021	772	998	702	1032	728	1063	758

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	52	57	52	55	54	55	60	60
0	9	8	9	8	9	9	10	9
1–4	5	7	6	8	8	9	8	9
5–14	2	5	5	7	6	8	7	9
15–44	12	24	14	23	16	23	17	22
45–64	213	236	222	235	234	234	244	233
65+	796	569	833	593	882	617	914	640
MENA								
Total	60	56	65	60	69	62	81	70
0	8	7	9	9	10	9	10	9
1–4	7	7	7	8	10	10	10	10
5–14	6	7	7	8	8	9	9	9
15–44	18	23	18	22	18	22	18	22
45–64	206	212	244	234	251	233	257	232
65+	737	510	925	625	956	644	979	664
Asia								
Total	70	70	85	74	101	87	130	113
0	10	9	13	8	10	9	10	9
1–4	6	7	29	25	10	10	9	9
5–14	7	8	5	6	9	9	8	9
15–44	17	22	22	24	17	22	17	24
45–64	241	235	268	227	253	236	258	238
65+	852	605	837	599	956	653	1021	719
Circulatory System and Certain Degenerative Diseases								
World								
Total	297	324	262	286	292	283	339	314
0	124	121	99	82	62	45	42	26
1–4	33	35	25	22	8	7	7	5
5–14	14	15	10	9	7	6	6	5
15–44	54	46	41	34	38	31	37	29
45–64	579	372	488	318	494	299	481	275
65+	3798	3396	3364	3245	3376	3070	3437	3108
Developed								
Total	463	552	473	563	486	536	575	597
0	40	9	26	19	0	0	0	0
1–4	19	21	11	17	1	2	1	1
5–14	4	1	1	1	1	0	1	0
15–44	40	17	32	11	30	11	28	9
45–64	530	253	506	216	443	169	440	157
65+	4170	3691	4064	3793	3485	3225	3507	3234
Developing								
Total	234	225	198	192	244	216	291	252
0	139	142	111	93	71	51	47	30
1–4	36	38	28	23	9	8	7	6
5–14	17	19	11	10	8	7	7	6
15–44	60	58	44	41	40	35	39	32
45–64	606	459	479	377	516	357	494	314
65+	3462	3005	2872	2682	3313	2943	3402	3028

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	500	567	461	518	513	551	615	639
0	30	11	34	25	0	0	0	0
1–4	26	29	17	26	1	2	0	1
5–14	2	1	1	0	0	0	0	0
15–44	29	10	22	6	21	6	19	5
45–64	502	203	417	142	410	123	412	121
65+	4193	3754	3689	3394	3501	3258	3466	3228
Nonmarket								
Total	392	524	495	644	437	509	505	526
0	60	5	14	11	0	0	0	0
1–4	7	4	2	4	1	2	2	2
5–14	7	3	2	2	3	1	2	1
15–44	58	31	51	19	47	20	42	16
45–64	595	343	670	338	510	260	497	225
65+	4105	3562	5140	4642	3447	3159	3610	3247
LAC								
Total	238	214	228	196	242	215	306	275
0	81	55	79	63	27	14	12	3
1–4	20	16	14	14	6	5	3	2
5–14	9	8	6	6	4	3	3	2
15–44	50	39	40	26	35	20	34	18
45–64	561	376	554	312	517	259	497	228
65+	3468	3116	3449	2960	3470	3002	3424	3028
Sub-Sahara								
Total	243	226	209	191	182	169	180	162
0	291	236	221	173	138	102	90	59
1–4	51	44	41	30	20	16	17	11
5–14	42	41	27	26	19	17	15	13
15–44	90	83	75	67	64	54	55	44
45–64	677	580	648	524	602	463	565	394
65+	3654	3135	3562	3047	3430	2948	3348	2860
MENA								
Total	250	224	200	183	191	171	209	176
0	192	191	166	128	72	49	44	26
1–4	26	30	29	29	7	6	6	6
5–14	24	27	13	12	8	7	7	5
15–44	78	81	45	43	43	41	38	34
45–64	669	552	563	421	540	398	522	343
65+	3498	2909	3518	3089	3419	3013	3365	2942
Asia								
Total	230	227	191	194	268	235	338	292
0	111	128	71	64	50	36	31	19
1–4	37	41	26	22	6	6	4	3
5–14	13	15	8	7	6	5	4	4
15–44	55	53	40	39	36	33	36	31
45–64	596	443	438	360	501	351	479	312
65+	3431	2982	2625	2546	3267	2924	3410	3063

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Complications of Pregnancy				
World								
Total	0	13	0	9	0	9	0	7
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	30	0	20	0	18	0	15
45–64	0	4	0	2	0	3	0	3
65+	0	0	0	0	0	0	0	0
Developed								
Total	0	2	0	1	0	1	0	1
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	4	0	3	0	2	0	1
45–64	0	1	0	1	0	1	0	1
65+	0	0	0	0	0	0	0	0
Developing								
Total	0	18	0	12	0	11	0	9
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	41	0	26	0	21	0	17
45–64	0	6	0	2	0	4	0	3
65+	0	0	0	0	0	0	0	0
Industrial								
Total	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	1	0	0	0	1	0	0
45–64	0	0	0	0	0	1	0	1
65+	0	0	0	0	0	0	0	0
Nonmarket								
Total	0	4	0	3	0	2	0	2
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	9	0	7	0	5	0	3
45–64	0	2	0	2	0	2	0	2
65+	0	0	0	0	0	0	0	0
LAC								
Total	0	12	0	6	0	4	0	3
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	27	0	13	0	8	0	6
45–64	0	4	0	2	0	2	0	2
65+	0	0	0	0	0	0	0	0

Table B3. Mortality rates per 100,000 (continued)

Region	*1970*		*1985*		*2000*		*2015*	
and age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	0	27	0	21	0	17	0	14
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	64	0	49	0	38	0	29
45–64	0	8	0	7	0	6	0	5
65+	0	0	0	0	0	0	0	0
MENA								
Total	0	21	0	13	0	12	0	10
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	49	0	29	0	26	0	20
45–64	0	8	0	5	0	5	0	4
65+	0	0	0	0	0	0	0	0
Asia								
Total	0	17	0	11	0	10	0	8
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	38	0	24	0	19	0	15
45–64	0	6	0	2	0	4	0	3
65+	0	0	0	0	0	0	0	0
			Certain Perinatal Conditions					
World								
Total	86	70	79	59	48	36	37	27
0	2778	2421	3095	2375	2129	1632	1889	1396
1–4	1	1	1	1	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Developed								
Total	26	10	15	10	13	9	13	7
0	1511	647	940	656	1004	705	976	616
1–4	0	1	5	4	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Developing								
Total	109	96	98	75	56	43	42	31
0	3009	2752	3459	2667	2279	1753	2009	1496
1–4	1	1	1	1	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	21	7	8	5	10	6	10	5
0	1201	451	551	387	798	558	785	463
1–4	0	1	7	5	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Nonmarket								
Total	37	15	28	17	20	13	19	11
0	2117	1030	1505	1035	1313	924	1243	828
1–4	0	0	1	2	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
LAC								
Total	61	42	65	44	40	28	30	20
0	1870	1314	2223	1572	1817	1369	1629	1175
1–4	1	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Sub-Sahara								
Total	200	157	167	129	119	90	82	61
0	4734	3843	3970	3165	3062	2406	2547	1936
1–4	2	2	1	1	1	1	1	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
MENA								
Total	140	126	120	97	73	57	52	39
0	3668	3350	3360	2672	2336	1808	2023	1520
1–4	1	1	1	1	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Asia								
Total	98	91	88	67	42	32	30	22
0	2749	2654	3558	2719	2017	1527	1778	1300
1–4	1	2	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0

Table B3. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Injury and Poisoning				
World								
Total	93	40	97	56	78	31	79	32
0	108	97	142	114	83	66	74	58
1–4	100	86	209	171	45	34	43	31
5–14	31	14	32	17	24	11	23	10
15–44	100	22	86	37	82	20	79	19
45–64	124	32	110	47	109	29	106	29
65+	217	153	209	157	201	144	205	151
Developed								
Total	99	51	87	40	77	37	80	39
0	82	36	52	37	42	31	41	27
1–4	263	223	136	130	30	28	26	23
5–14	27	6	16	5	13	4	13	4
15–44	78	15	79	14	62	10	58	8
45–64	103	30	97	27	97	23	96	22
65+	226	176	200	142	209	163	210	164
Developing								
Total	91	35	100	62	78	29	79	30
0	113	108	157	127	88	71	79	61
1–4	65	56	222	178	47	35	45	32
5–14	33	16	35	19	25	12	24	11
15–44	109	25	88	44	86	23	82	21
45–64	136	33	117	58	113	31	108	31
65+	208	122	216	171	197	128	202	142
Industrial								
Total	98	58	74	40	70	36	74	40
0	79	30	41	28	34	24	33	20
1–4	368	316	168	170	25	26	17	18
5–14	24	3	11	2	8	2	9	2
15–44	63	11	58	10	49	7	45	6
45–64	89	28	78	24	87	19	87	19
65+	225	187	195	150	210	167	209	168
Nonmarket								
Total	100	40	109	39	90	38	90	37
0	88	48	69	50	54	40	51	36
1–4	64	49	89	75	38	30	39	31
5–14	32	11	26	10	21	8	19	7
15–44	105	20	119	21	86	15	78	12
45–64	137	33	133	32	118	30	115	28
65+	230	155	214	125	208	155	213	156
LAC								
Total	98	31	90	29	76	28	78	29
0	74	56	88	73	72	57	65	49
1–4	67	45	49	37	46	34	43	30
5–14	32	13	27	13	22	10	21	10
15–44	119	24	103	21	83	20	76	17
45–64	157	35	153	32	113	29	108	28
65+	258	133	259	132	205	145	203	152

Table B3. Mortality rates per 100,000 (continued)

Region	*1970*		*1985*		*2000*		*2015*	
and age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	108	39	96	34	86	30	82	28
0	174	150	147	125	115	96	97	78
1–4	74	60	67	51	54	41	52	38
5–14	50	22	39	18	33	15	30	14
15–44	133	26	120	25	111	24	103	23
45–64	149	33	143	32	133	32	125	32
65+	210	118	206	119	202	120	199	121
MENA								
Total	90	37	80	32	75	28	76	28
0	130	126	126	106	90	73	79	62
1–4	54	47	59	50	46	34	46	34
5–14	36	19	29	14	25	12	25	12
15–44	113	30	94	23	92	23	86	23
45–64	135	34	124	32	120	32	116	31
65+	197	110	206	129	201	128	200	129
Asia								
Total	87	34	105	78	77	29	79	31
0	104	105	181	143	79	63	70	54
1–4	65	59	334	272	45	34	42	29
5–14	29	15	37	21	23	11	22	10
15–44	104	24	79	55	81	23	77	21
45–64	131	32	108	69	110	31	105	31
65+	200	122	211	189	195	126	202	145
			Other Causes					
World								
Total	273	289	201	204	161	167	157	150
0	2204	2075	1666	1386	1280	1019	1013	772
1–4	432	457	349	342	109	93	88	66
5–14	57	57	39	35	29	24	26	20
15–44	60	61	39	39	29	34	25	28
45–64	245	186	163	128	126	115	105	90
65+	1700	1612	1539	1419	1473	1373	1428	1222
Developed								
Total	153	180	161	154	160	152	191	163
0	881	365	587	425	213	159	177	105
1–4	190	206	329	344	12	21	12	17
5–14	16	5	10	4	5	2	5	1
15–44	23	12	28	8	11	4	8	3
45–64	124	76	128	57	72	24	65	16
65+	1057	1051	1047	834	1273	929	1317	911
Developing								
Total	318	336	213	221	162	171	150	147
0	2446	2394	1849	1550	1422	1133	1122	858
1–4	484	511	352	341	123	103	99	73
5–14	69	72	45	41	33	27	29	22
15–44	75	82	42	48	33	41	28	33
45–64	312	266	181	169	149	156	118	113
65+	2282	2358	1884	2020	1589	1736	1482	1417

Table B3. Mortality rates per 100,000 (continued)

Region	*1970*		*1985*		*2000*		*2015*	
and age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	125	135	120	128	154	131	171	123
0	614	255	535	395	97	80	82	43
1–4	244	289	154	193	10	21	4	11
5–14	8	2	4	1	2	0	2	0
15–44	14	7	14	4	3	1	2	1
45–64	84	49	80	38	31	1	30	0
65+	779	715	821	725	1239	806	1133	653
Nonmarket								
Total	209	260	237	200	172	189	225	231
0	1402	580	663	467	386	276	311	192
1–4	87	49	577	553	15	21	23	25
5–14	29	9	20	9	11	4	9	3
15–44	40	20	55	16	24	9	17	6
45–64	218	124	217	89	155	69	133	47
65+	1819	1729	1696	1066	1352	1177	1769	1495
LAC								
Total	255	227	213	184	124	111	119	102
0	1891	1400	1627	1323	915	723	703	518
1–4	265	234	286	273	78	69	34	26
5–14	47	38	31	22	17	10	13	7
15–44	63	61	36	26	22	16	16	12
45–64	306	232	215	125	123	71	97	50
65+	2078	1921	2135	1799	1520	1253	1342	1022
Sub-Sahara								
Total	491	438	386	334	258	233	196	174
0	4159	3388	3306	2655	2292	1833	1718	1324
1–4	670	577	536	399	266	203	225	144
5–14	171	158	111	100	77	66	60	49
15–44	135	123	104	94	80	74	61	56
45–64	420	350	366	299	287	245	223	184
65+	2548	2732	2307	2401	1997	2091	1795	1790
MENA								
Total	400	404	260	263	157	166	131	137
0	3470	3320	2636	2129	1483	1187	1135	879
1–4	391	435	377	376	92	85	75	73
5–14	80	87	54	48	32	26	26	21
15–44	100	103	44	55	39	50	30	38
45–64	422	350	218	214	180	194	146	145
65+	2921	3048	1986	2253	1736	1960	1587	1695
Asia								
Total	289	327	175	199	147	167	145	149
0	2051	2199	1265	1105	1131	890	867	651
1–4	498	555	307	329	85	75	53	44
5–14	53	60	32	29	23	18	18	13
15–44	64	76	33	43	24	37	20	29
45–64	286	249	148	152	130	151	102	109
65+	2193	2305	1783	1985	1539	1748	1454	1405

Table B4. Mortality rates per 100,000 from major c·..es, by age, sex, and region, 1970–2015

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				All Causes				
World								
Total	23778	23614	25842	24057	26900	24576	33323	28950
0	5205	4607	5282	4111	4035	3092	3431	2512
1–4	3630	3666	3186	2854	1202	1022	1036	779
5–14	962	995	892	795	753	642	720	584
15–44	3052	2659	3011	2627	3247	2855	3499	2902
45–64	3875	2808	4666	3307	5461	3834	7582	4983
65+	7053	8878	8806	10363	12203	13129	17055	17190
Developed								
Total	5323	5953	5941	6106	6132	6181	7470	7053
0	306	119	171	118	115	77	108	63
1–4	262	241	274	269	18	29	18	24
5–14	71	19	35	14	23	9	21	7
15–44	427	171	481	143	344	109	283	83
45–64	1063	699	1340	700	1313	604	1540	661
65+	3194	4704	3640	4862	4319	5354	5501	6216
Developing								
Total	18455	17661	19901	17951	20769	18394	25853	21896
0	4899	4488	5111	3993	3920	3015	3323	2449
1–4	3369	3425	2913	2585	1184	994	1018	755
5–14	891	976	857	781	730	633	699	578
15–44	2625	2488	2529	2485	2902	2746	3216	2818
45–64	2813	2109	3326	2607	4148	3230	6042	4323
65+	3859	4174	5165	5501	7884	7775	11555	10974
Industrial								
Total	3448	3657	3640	3672	3988	3864	4795	4410
0	132	49	65	44	46	32	45	25
1–4	221	221	88	96	9	17	5	10
5–14	27	5	11	3	7	2	8	2
15–44	187	64	195	54	153	38	126	29
45–64	644	358	723	335	757	301	902	346
65+	2236	2960	2558	3140	3015	3474	3709	3998
Nonmarket								
Total	1875	2296	2301	2434	2144	2318	2675	2643
0	173	69	107	74	68	46	63	38
1–4	41	20	186	174	8	11	13	14
5–14	44	14	24	11	16	7	13	5
15–44	240	107	286	88	192	70	156	54
45–64	419	342	616	365	555	303	638	315
65+	958	1744	1082	1722	1304	1880	1792	2217
LAC								
Total	1557	1274	1768	1416	1778	1474	2294	1907
0	365	259	370	285	243	183	195	137
1–4	185	159	163	152	72	64	31	24
5–14	65	50	52	39	38	25	30	18
15–44	205	156	226	132	222	126	233	124
45–64	265	184	326	197	403	239	610	341
65+	471	466	631	611	800	837	1196	1264

Table B4. Mortality rates per 100,000 (continued)

Region	*1970*		*1985*		*2000*		*2015*	
and age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	3138	2796	3885	3318	4257	3697	5093	4264
0	1078	884	1337	1072	1370	1084	1309	994
1–4	583	505	733	551	536	414	595	385
5–14	263	266	273	267	305	281	337	296
15–44	501	455	603	531	781	670	991	809
45–64	336	281	444	368	568	482	807	631
65+	376	405	495	529	697	767	1053	1149
MENA								
Total	1993	1843	2272	2042	2264	2046	2831	2454
0	644	586	778	610	605	465	543	402
1–4	252	274	387	373	128	119	122	119
5–14	107	117	107	97	95	84	98	82
15–44	291	282	246	255	347	362	418	413
45–64	292	215	291	238	412	339	658	477
65+	407	370	462	468	677	676	992	960
Asia								
Total	11768	11747	11976	11175	12469	11177	15634	13272
0	2811	2759	2626	2025	1702	1284	1277	916
1–4	2349	2487	1630	1510	448	397	270	227
5–14	456	544	424	378	291	243	233	181
15–44	1628	1595	1454	1567	1553	1588	1574	1473
45–64	1920	1429	2265	1804	2766	2171	3967	2874
65+	2604	2933	3577	3892	5710	5495	8313	7600
	Infectious and Parasitic Diseases							
World								
Total	8255	8280	7725	7039	5491	5495	5300	4957
0	2229	2092	2185	1767	1538	1221	1200	907
1–4	2409	2479	1788	1624	737	646	615	470
5–14	490	610	422	456	316	336	285	293
15–44	1213	1278	942	998	828	1133	755	1007
45–64	846	591	945	713	585	552	531	460
65+	1068	1230	1444	1480	1487	1608	1914	1819
Developed								
Total	737	621	616	444	479	376	577	422
0	84	30	27	20	10	7	6	2
1–4	64	58	96	92	1	10	3	8
5–14	17	3	5	2	1	0	0	0
15–44	66	21	65	6	16	0	0	0
45–64	135	61	102	28	67	1	56	0
65+	371	449	321	295	384	358	512	412
Developing								
Total	7518	7658	7109	6595	5013	5119	4723	4535
0	2145	2062	2158	1747	1528	1215	1195	905
1–4	2345	2421	1693	1532	736	636	612	462
5–14	473	607	417	454	315	336	285	293
15–44	1147	1257	877	992	812	1133	755	1007
45–64	711	531	842	685	518	551	476	460
65+	697	781	1122	1185	1103	1249	1401	1408

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	351	305	303	255	254	192	277	162
0	20	8	3	2	0	0	0	0
1–4	45	53	8	9	1	6	0	4
5–14	2	1	1	0	0	0	0	0
15–44	9	4	6	2	0	0	0	0
45–64	48	21	33	15	0	0	0	0
65+	226	219	253	226	253	186	276	158
Nonmarket								
Total	386	316	313	190	224	183	300	260
0	64	22	24	18	10	7	6	2
1–4	18	5	88	83	0	4	3	5
5–14	15	3	5	2	1	0	0	0
15–44	57	16	58	4	16	0	0	0
45–64	87	40	69	13	67	1	56	0
65+	145	230	69	69	130	173	236	254
LAC								
Total	519	425	423	355	264	226	213	178
0	184	132	136	113	80	63	55	39
1–4	119	106	85	81	40	38	11	9
5–14	29	27	18	17	8	7	4	3
15–44	59	55	48	37	17	19	10	14
45–64	53	35	50	27	24	10	14	6
65+	76	71	86	80	94	90	120	106
Sub-Sahara								
Total	1552	1393	1838	1565	1772	1552	1860	1553
0	506	422	613	500	595	482	536	416
1–4	415	361	518	390	365	283	400	256
5–14	161	177	160	173	170	176	178	178
15–44	279	257	314	288	373	345	416	381
45–64	113	87	137	105	146	123	160	127
65+	78	88	97	108	123	144	170	195
MENA								
Total	795	792	881	862	611	662	582	646
0	282	267	346	277	239	190	196	150
1–4	169	189	269	263	75	74	66	72
5–14	56	71	55	59	40	44	36	39
15–44	132	141	78	120	96	164	84	160
45–64	85	58	57	56	63	74	66	75
65+	73	66	76	88	100	117	134	151
Asia								
Total	4651	5048	3967	3813	2366	2678	2067	2158
0	1174	1241	1064	857	613	480	407	300
1–4	1642	1765	821	798	256	241	135	125
5–14	227	332	184	205	98	108	67	73
15–44	677	804	436	547	326	606	245	453
45–64	461	351	599	498	285	345	236	252
65+	470	555	864	909	788	898	978	956

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Neoplasms				
World								
Total	1750	1778	2610	2293	3361	3005	4854	4245
0	5	4	7	5	7	6	7	6
1–4	34	36	50	45	25	24	26	24
5–14	29	28	31	30	51	52	55	54
15–44	134	163	220	234	247	284	291	358
45–64	615	591	973	785	1248	1073	1901	1608
65+	933	956	1330	1193	1784	1565	2575	2194
Developed								
Total	842	907	1154	1036	1121	1093	1370	1253
0	1	0	1	1	1	1	1	1
1–4	22	23	11	12	2	3	2	2
5–14	8	4	5	3	5	3	5	3
15–44	41	41	49	44	43	36	39	29
45–64	234	223	356	265	358	271	435	309
65+	535	615	732	711	712	779	888	909
Developing								
Total	908	871	1456	1257	2240	1912	3484	2993
0	4	4	6	4	6	5	6	6
1–4	12	12	39	33	22	22	23	22
5–14	22	24	26	27	45	49	50	52
15–44	92	121	171	189	204	248	252	329
45–64	380	368	617	521	890	802	1466	1299
65+	398	341	598	482	1073	786	1686	1285
Industrial								
Total	620	604	885	744	775	702	963	842
0	1	0	0	0	0	0	0	0
1–4	20	21	9	10	1	2	1	1
5–14	4	1	2	1	2	1	2	1
15–44	24	17	27	17	25	14	21	11
45–64	161	128	241	149	242	155	289	179
65+	411	437	606	566	505	531	650	649
Nonmarket								
Total	221	303	268	292	346	391	406	411
0	0	0	0	0	0	0	0	0
1–4	2	2	2	2	1	1	1	1
5–14	4	3	3	3	3	3	3	2
15–44	18	24	22	27	19	22	18	18
45–64	74	95	115	115	116	116	146	130
65+	124	178	126	145	206	248	238	259
LAC								
Total	112	107	153	141	247	226	389	349
0	0	0	1	0	1	1	1	1
1–4	3	2	2	2	2	2	2	2
5–14	2	2	3	3	5	5	5	5
15–44	9	13	14	17	24	26	27	29
45–64	38	38	54	51	99	87	164	136
65+	59	51	79	67	117	106	190	177

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	75	84	116	126	192	200	324	325
0	1	0	1	1	1	1	2	2
1–4	1	1	2	3	4	4	5	6
5–14	1	2	3	4	6	8	10	12
15–44	7	15	13	22	24	34	41	55
45–64	33	38	49	56	79	86	137	138
65+	33	27	48	41	78	67	129	113
MENA								
Total	76	67	125	110	202	172	331	277
0	0	0	1	1	1	1	1	1
1–4	1	1	2	2	3	3	4	4
5–14	2	2	4	4	6	7	8	8
15–44	9	11	15	17	24	27	35	41
45–64	30	29	50	47	80	72	146	123
65+	34	24	54	39	87	63	137	99
Asia								
Total	646	613	1063	880	1599	1313	2440	2042
0	3	3	4	2	3	3	3	3
1–4	7	8	33	27	13	12	12	10
5–14	17	17	16	15	28	29	27	27
15–44	66	83	130	133	133	161	149	205
45–64	280	263	464	366	632	558	1019	901
65+	272	239	416	336	790	550	1230	896
Circulatory System and Certain Degenerative Diseases								
World								
Total	5464	5970	6362	6846	9101	8662	12843	11714
0	71	64	61	48	44	30	31	19
1–4	69	69	58	49	22	19	19	14
5–14	61	61	52	45	46	39	44	35
15–44	432	352	461	365	557	429	648	482
45–64	1475	1019	1761	1163	2461	1482	3580	2025
65+	3357	4404	3970	5176	5970	6664	8520	9140
Developed								
Total	2339	3074	2681	3394	2990	3439	3699	3978
0	4	1	2	2	0	0	0	0
1–4	7	7	4	6	0	1	0	0
5–14	4	1	1	1	1	0	1	0
15–44	90	40	85	27	84	30	72	23
45–64	485	292	609	293	643	259	769	281
65+	1750	2732	1979	3066	2262	3150	2856	3674
Developing								
Total	3124	2897	3681	3452	6111	5223	9144	7736
0	67	64	59	47	44	30	31	19
1–4	62	62	54	44	22	18	19	14
5–14	56	60	51	44	45	38	43	34
15–44	342	312	376	337	473	399	576	459
45–64	989	727	1151	870	1818	1223	2812	1744
65+	1608	1672	1990	2110	3709	3514	5664	5466

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	1665	2032	1702	2002	2033	2258	2514	2694
0	2	1	2	1	0	0	0	0
1–4	6	7	3	5	0	0	0	0
5–14	1	0	1	0	0	0	0	0
15–44	43	15	38	10	37	10	30	7
45–64	323	151	326	119	400	125	477	143
65+	1290	1858	1332	1866	1595	2123	2006	2544
Nonmarket								
Total	674	1042	979	1392	957	1181	1185	1284
0	2	0	1	0	0	0	0	0
1–4	1	0	0	1	0	0	0	0
5–14	3	1	1	1	1	0	1	0
15–44	47	26	47	17	47	20	42	15
45–64	162	141	284	173	242	134	292	138
65+	460	874	647	1200	666	1026	850	1130
LAC								
Total	337	303	456	393	636	569	972	883
0	4	2	5	4	2	1	1	0
1–4	4	3	3	3	1	1	1	0
5–14	4	3	3	3	2	2	2	1
15–44	30	23	37	24	45	25	53	27
45–64	96	65	134	79	192	102	305	147
65+	201	207	275	231	394	438	611	707
Sub-Sahara								
Total	353	336	470	439	648	609	970	881
0	18	14	21	16	19	14	16	10
1–4	11	9	13	10	10	8	11	7
5–14	16	16	17	16	19	17	21	18
15–44	54	52	69	63	96	83	134	107
45–64	103	93	144	125	202	169	316	234
65+	151	152	205	208	302	318	473	504
MENA								
Total	319	271	383	333	557	477	855	693
0	9	9	11	8	7	4	5	3
1–4	5	5	7	7	2	2	2	2
5–14	8	9	7	6	6	5	6	5
15–44	40	40	38	34	56	50	74	62
45–64	97	75	115	85	173	123	297	182
65+	159	134	205	193	313	293	471	439
Asia								
Total	2115	1987	2373	2288	4269	3569	6348	5279
0	36	38	22	19	17	11	10	6
1–4	43	45	31	24	8	7	5	4
5–14	28	33	24	19	18	15	14	11
15–44	218	197	232	217	276	241	316	263
45–64	694	495	759	581	1251	829	1893	1180
65+	1097	1179	1306	1428	2700	2466	4109	3816

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Complications of Pregnancy				
World								
Total	0	239	0	225	0	265	0	269
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	1	0	0	0	0	0	0
15–44	0	229	0	218	0	249	0	249
45–64	0	10	0	7	0	16	0	20
65+	0	0	0	0	0	0	0	0
Developed								
Total	0	10	0	8	0	7	0	5
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	9	0	7	0	6	0	4
45–64	0	1	0	1	0	2	0	2
65+	0	0	0	0	0	0	0	0
Developing								
Total	0	229	0	218	0	257	0	263
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	1	0	0	0	0	0	0
15–44	0	220	0	212	0	243	0	245
45–64	0	9	0	6	0	14	0	18
65+	0	0	0	0	0	0	0	0
Industrial								
Total	0	2	0	0	0	2	0	1
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	2	0	0	0	1	0	1
45–64	0	0	0	0	0	1	0	1
65+	0	0	0	0	0	0	0	0
Nonmarket								
Total	0	9	0	7	0	6	0	4
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	8	0	6	0	5	0	3
45–64	0	1	0	1	0	1	0	1
65+	0	0	0	0	0	0	0	0
LAC								
Total	0	16	0	12	0	12	0	11
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	16	0	12	0	11	0	10
45–64	0	1	0	1	0	1	0	1
65+	0	0	0	0	0	0	0	0

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	0	41	0	48	0	61	0	74
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	39	0	46	0	59	0	71
45–64	0	1	0	2	0	2	0	3
65+	0	0	0	0	0	0	0	0
MENA								
Total	0	25	0	23	0	33	0	39
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	24	0	22	0	32	0	37
45–64	0	1	0	1	0	2	0	2
65+	0	0	0	0	0	0	0	0
Asia								
Total	0	147	0	134	0	151	0	139
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	141	0	131	0	142	0	127
45–64	0	6	0	3	0	9	0	12
65+	0	0	0	0	0	0	0	0
Certain Perinatal Conditions								
World								
Total	1585	1292	1915	1406	1492	1102	1393	992
0	1582	1290	1912	1404	1492	1102	1392	991
1–4	2	3	3	2	1	1	1	1
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Developed								
Total	133	54	86	58	83	55	83	50
0	133	54	84	56	83	55	83	50
1–4	0	0	2	1	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Developing								
Total	1452	1238	1829	1349	1410	1047	1310	942
0	1450	1236	1828	1348	1409	1046	1309	941
1–4	2	2	1	1	1	1	1	1
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	70	25	31	20	39	26	39	22
0	70	25	29	19	39	26	39	22
1–4	0	0	1	1	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Nonmarket								
Total	63	29	55	37	43	29	44	28
0	63	29	55	37	43	29	44	28
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
LAC								
Total	87	59	129	89	104	75	94	65
0	87	59	129	89	104	75	94	65
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Sub-Sahara								
Total	290	233	376	296	423	326	442	329
0	289	233	376	296	422	326	441	329
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
MENA								
Total	178	153	231	177	214	159	213	154
0	178	153	231	177	214	159	213	154
1–4	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0
Asia								
Total	897	793	1093	787	668	486	561	394
0	896	791	1092	787	668	486	561	394
1–4	1	2	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
				Injury and Poisoning				
World								
Total	1713	734	2345	1349	2423	938	2999	1176
0	61	52	88	67	58	45	55	41
1–4	210	171	482	378	122	90	123	86
5–14	136	57	174	86	153	68	158	69
15–44	798	169	956	398	1194	282	1371	326
45–64	316	87	398	170	540	141	786	211
65+	191	199	247	250	356	313	507	443
Developed								
Total	498	286	491	238	473	235	513	259
0	7	3	5	3	3	2	3	2
1–4	98	79	47	43	10	9	9	8
5–14	26	6	15	4	12	4	11	3
15–44	177	33	209	36	171	26	151	21
45–64	94	35	117	36	141	35	168	39
65+	95	131	98	115	136	159	171	187
Developing								
Total	1215	448	1854	1110	1950	704	2486	916
0	54	49	83	64	54	42	51	39
1–4	112	92	435	335	112	81	114	78
5–14	109	51	159	81	141	64	147	66
15–44	620	136	747	362	1023	256	1220	305
45–64	222	52	281	134	399	107	618	172
65+	97	68	149	135	220	153	336	257
Industrial								
Total	326	207	274	155	277	146	303	168
0	5	2	2	1	2	1	2	1
1–4	90	73	34	33	5	5	3	3
5–14	15	2	6	1	4	1	4	1
15–44	92	16	101	17	85	11	72	9
45–64	57	21	61	20	85	19	101	22
65+	69	93	71	83	96	109	121	132
Nonmarket								
Total	171	80	216	83	196	89	210	91
0	3	1	3	2	2	1	2	1
1–4	8	6	13	10	5	4	5	4
5–14	12	4	9	3	7	3	7	2
15–44	86	17	109	19	86	15	79	12
45–64	37	14	56	16	56	15	67	17
65+	26	38	27	32	40	50	50	54
LAC								
Total	139	44	181	58	199	74	247	94
0	3	2	5	4	4	3	4	3
1–4	12	8	11	8	10	7	10	6
5–14	12	5	13	6	13	6	12	5
15–44	70	14	95	19	107	25	119	26
45–64	27	6	37	8	42	11	67	18
65+	15	9	21	13	23	21	36	35

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	157	58	215	79	305	109	442	154
0	11	9	14	12	16	13	17	13
1–4	15	13	22	17	26	20	33	24
5–14	19	9	24	11	33	15	43	19
15–44	80	16	111	24	167	37	251	58
45–64	23	5	32	8	45	12	70	19
65+	9	6	12	8	18	13	28	21
MENA								
Total	115	44	154	58	220	77	311	108
0	6	6	9	7	8	6	8	6
1–4	9	8	15	12	16	11	19	13
5–14	13	6	15	6	19	9	23	10
15–44	58	15	78	18	120	28	167	42
45–64	20	5	25	6	38	10	66	17
65+	9	5	12	8	18	12	28	19
Asia								
Total	804	301	1304	916	1224	443	1486	560
0	34	31	55	41	26	20	22	16
1–4	75	64	388	298	59	43	52	35
5–14	65	32	106	58	75	35	69	31
15–44	412	90	463	301	629	165	684	179
45–64	153	36	187	112	274	74	415	119
65+	64	48	105	106	161	107	244	181
			Other Causes					
World								
Total	5011	5320	4885	4899	5032	5108	5934	5597
0	1256	1105	1029	819	897	688	746	548
1–4	906	908	805	755	295	243	253	184
5–14	247	239	213	178	188	148	178	133
15–44	477	469	432	414	420	478	433	480
45–64	623	510	589	468	627	570	784	659
65+	1503	2090	1816	2263	2605	2981	3540	3593
Developed								
Total	774	1000	913	929	986	976	1229	1086
0	77	31	52	36	18	12	15	9
1–4	71	73	115	115	4	7	4	5
5–14	16	5	9	4	5	2	4	1
15–44	53	27	73	22	30	11	20	7
45–64	114	88	154	78	104	37	113	29
65+	443	778	510	674	826	908	1072	1035
Developing								
Total	4238	4320	3972	3970	4046	4132	4705	4511
0	1178	1075	977	783	879	676	731	539
1–4	835	836	690	640	291	236	249	178
5–14	231	234	205	175	183	146	174	132
15–44	424	442	359	393	390	467	413	473
45–64	510	422	435	391	523	534	671	630
65+	1060	1312	1305	1589	1779	2073	2467	2558

Table B4. Mortality rates per 100,000 (continued)

Region and age	*1970*		*1985*		*2000*		*2015*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	414	483	445	496	609	537	700	521
0	36	14	28	20	5	4	4	2
1–4	59	67	32	38	2	4	1	2
5–14	5	1	2	1	1	0	1	0
15–44	20	10	24	8	6	2	4	1
45–64	54	37	62	32	30	1	35	0
65+	240	354	297	399	565	525	656	515
Nonmarket								
Total	359	517	469	433	377	439	529	565
0	42	16	24	17	13	9	11	6
1–4	11	6	83	78	2	3	3	3
5–14	11	3	7	3	4	1	3	1
15–44	32	17	50	14	24	9	17	6
45–64	59	51	92	46	74	35	78	29
65+	204	424	214	276	261	382	417	520
LAC								
Total	362	320	426	368	327	292	379	328
0	88	63	95	75	52	40	41	29
1–4	47	41	62	58	18	15	8	6
5–14	18	14	15	10	10	6	7	4
15–44	37	36	33	23	29	21	25	19
45–64	52	40	52	31	46	28	60	32
65+	120	128	170	171	172	183	239	239
Sub-Sahara								
Total	712	652	869	766	917	840	1055	947
0	254	206	313	248	316	248	298	225
1–4	141	120	177	131	130	98	145	92
5–14	66	62	69	62	77	65	85	69
15–44	81	76	96	89	121	113	150	137
45–64	64	56	81	72	96	90	125	110
65+	105	132	133	164	176	225	253	316
MENA								
Total	510	490	499	479	459	464	538	537
0	168	151	181	141	136	105	120	89
1–4	68	71	94	89	32	28	30	28
5–14	28	28	27	23	24	19	25	19
15–44	51	51	37	43	51	62	58	71
45–64	61	47	45	43	58	60	83	77
65+	133	141	116	141	159	191	222	253
Asia								
Total	2654	2858	2177	2357	2343	2536	2732	2699
0	668	655	389	320	375	283	273	197
1–4	579	603	357	362	111	95	66	53
5–14	119	130	94	80	73	56	57	41
15–44	254	280	194	237	189	272	181	246
45–64	332	278	257	245	324	356	403	411
65+	701	912	887	1113	1271	1474	1752	1751

Table B5. Mortality rates per 100,000 from specific causes by age, sex, and region, 1985

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Diarrhea		**Tuberculosis**		**Acute respiratory infection**		**Measles**		**COPD**	
World										
Total	61	63	21	14	122	108	7	10	43	38
0	1136	962	9	6	1160	966	105	91	288	262
1–4	71	140	6	8	550	365	30	43	9	26
5–14	32	25	2	4	17	24	7	14	2	3
15–44	24	27	16	13	21	28	1	2	3	3
45–64	32	32	55	28	59	52	0	0	53	35
65+	55	60	81	35	376	365	0	0	514	322
Developed										
Total	2	2	6	1	37	35	0	0	37	20
0	70	58	1	1	118	91	2	2	13	10
1–4	6	8	1	3	121	90	1	2	3	9
5–14	0	0	0	0	2	1	0	0	0	0
15–44	0	0	4	0	5	1	0	0	2	1
45–64	0	0	10	1	18	5	0	0	29	11
65+	2	2	17	6	254	201	0	0	351	126
Developing										
Total	80	84	25	19	148	132	10	13	45	43
0	1316	1115	10	7	1336	1115	122	106	334	305
1–4	83	164	7	9	626	414	35	51	10	29
5–14	39	30	2	4	20	28	9	17	3	4
15–44	32	35	20	18	26	37	1	2	4	4
45–64	48	51	77	44	80	80	0	1	65	49
65+	91	118	126	65	462	534	0	1	630	523
Industrial										
Total	1	1	2	1	33	38	0	0	43	23
0	5	3	0	0	29	21	0	0	2	1
1–4	2	3	0	1	16	20	1	1	3	3
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	1	0	0	0	1	0
45–64	0	0	3	1	12	5	0	0	25	11
65+	3	3	17	6	297	251	0	0	378	143
Nonmarket										
Total	4	3	11	1	45	29	0	0	27	15
0	164	136	2	1	246	189	5	4	28	22
1–4	11	14	3	5	270	187	2	2	4	18
5–14	0	0	0	0	4	2	0	0	0	0
15–44	0	0	11	0	12	1	0	0	3	1
45–64	0	0	23	1	28	5	0	0	35	10
65+	1	1	18	5	132	96	0	0	272	91
LAC										
Total	51	49	15	9	80	63	4	4	31	25
0	931	807	7	5	821	693	45	38	225	213
1–4	71	113	4	5	252	164	19	19	6	19
5–14	13	12	2	2	11	11	2	2	1	2
15–44	12	9	13	9	14	11	0	0	4	3
45–64	32	19	43	16	49	27	0	0	46	24
65+	103	106	75	37	339	330	0	0	411	252

Table B5. Mortality rates per 100,000 from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara										
Total	272	238	28	24	361	260	38	49	51	49
0	2699	2227	12	13	2280	1869	322	275	624	552
1–4	141	310	11	16	1243	574	86	106	23	54
5–14	146	96	3	10	47	77	36	71	7	11
15–44	169	126	33	25	91	110	4	7	1	1
45–64	223	154	87	55	168	139	0	1	46	40
65+	254	307	129	74	604	684	1	1	544	373
MENA										
Total	122	150	20	20	212	184	18	29	43	42
0	2073	1727	12	10	1773	1465	204	177	478	427
1–4	101	291	8	15	847	538	58	114	16	51
5–14	52	42	3	5	24	34	12	24	3	5
15–44	27	51	20	23	26	50	1	3	5	5
45–64	48	79	62	41	71	83	0	0	53	39
65+	125	241	93	65	460	614	0	1	499	364
Asia										
Total	43	49	27	19	111	111	4	6	46	46
0	793	677	10	4	1045	874	56	49	233	215
1–4	65	102	6	6	473	388	18	26	5	18
5–14	18	17	2	3	15	19	3	6	2	3
15–44	14	21	19	17	18	28	1	1	4	4
45–64	28	37	82	47	74	79	0	1	71	56
65+	67	84	138	68	466	541	0	1	690	605
	Polio		**Yellow fever**		**Malaria**		**Schistosomiasis**		**Intestinal parasites**	
World										
Total	1	0	0	0	3	3	0	0	2	3
0	8	3	0	0	44	35	0	0	27	21
1–4	3	2	0	1	4	3	0	0	4	15
5–14	0	0	0	0	2	2	0	0	3	4
15–44	0	0	0	0	1	1	0	0	1	0
45–64	0	0	0	0	3	3	1	0	2	1
65+	0	0	0	0	6	5	2	1	1	1
Developed										
Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1
1–4	0	1	0	0	0	0	0	0	1	4
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
Developing										
Total	1	1	0	0	4	4	0	0	3	4
0	9	3	0	0	52	41	0	0	31	24
1–4	4	3	0	2	5	3	0	0	5	17
5–14	0	0	0	0	2	2	0	0	4	4
15–44	0	0	0	0	2	2	0	0	1	1
45–64	0	0	0	0	5	4	1	1	3	1
65+	1	1	0	0	11	10	3	2	1	1

Table B5. Mortality rates per 100,000 from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial										
Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
Nonmarket										
Total	0	0	0	0	0	0	0	0	1	1
0	1	0	0	0	0	0	0	0	2	1
1–4	0	1	0	1	0	0	0	0	2	9
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	1	0
65+	0	0	0	0	0	0	0	0	0	0
LAC										
Total	1	0	0	0	1	1	0	0	2	2
0	5	3	0	0	4	5	0	0	15	12
1–4	3	2	0	1	1	1	0	0	4	9
5–14	0	0	0	0	1	1	0	0	1	1
15–44	0	0	0	0	1	1	0	0	0	0
45–64	0	0	0	0	2	1	0	0	2	0
65+	0	0	0	0	3	3	0	0	1	1
Sub-Sahara										
Total	1	1	1	0	5	4	0	0	9	9
0	7	3	0	0	94	69	0	0	56	43
1–4	2	3	0	2	1	1	0	0	8	20
5–14	0	0	0	0	1	0	0	0	14	12
15–44	0	0	1	0	0	0	0	0	3	2
45–64	0	0	0	0	5	4	1	0	6	2
65+	0	0	0	0	7	7	1	0	1	2
MENA										
Total	1	1	0	0	4	4	0	0	4	5
0	6	3	0	0	50	40	0	0	43	33
1–4	2	2	0	1	1	1	0	0	6	16
5–14	0	0	0	0	3	3	0	0	5	5
15–44	0	0	0	0	2	3	1	0	1	1
45–64	0	0	0	0	4	3	1	0	3	1
65+	0	0	0	0	5	6	1	0	1	1
Asia										
Total	1	1	0	0	5	4	1	0	2	3
0	11	3	0	0	48	40	0	0	24	19
1–4	4	3	0	2	8	5	0	0	4	18
5–14	0	0	0	0	2	2	0	0	2	3
15–44	0	0	0	0	2	2	0	0	1	0
45–64	1	0	0	0	6	5	2	1	3	1
65+	1	1	0	0	13	12	4	3	1	1

Table B5. Mortality rates per 100,000 from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Ischemic heart disease		**Cerebrovascular disease**		**Other cardiovascular**		**Diabetes**		**Certain degenerative**	
World										
Total	83	80	66	92	76	78	8	13	29	22
0	2	1	17	13	63	50	3	4	14	14
1–4	0	0	4	4	13	15	1	1	7	3
5–14	0	0	1	1	6	5	0	0	2	2
15–44	9	3	6	9	13	13	1	2	12	7
45–64	178	71	107	100	111	79	17	25	75	44
65+	1076	1025	957	1080	1009	847	96	122	227	172
Developed										
Total	207	208	103	160	118	155	10	17	34	24
0	0	0	3	2	18	14	0	0	5	3
1–4	0	0	1	2	7	12	0	1	2	2
5–14	0	0	0	0	1	1	0	0	0	0
15–44	12	2	4	2	8	4	1	1	7	3
45–64	249	72	87	61	95	50	11	9	64	25
65+	1726	1425	961	1080	1085	1052	87	107	206	129
Developing										
Total	45	38	55	69	63	52	7	12	27	22
0	2	2	20	15	70	56	4	5	15	16
1–4	0	0	5	4	14	15	2	1	8	3
5–14	0	0	2	2	7	6	0	0	2	2
15–44	9	4	6	11	14	16	2	2	13	9
45–64	142	70	117	123	119	96	20	34	80	55
65+	619	614	954	1080	956	635	101	138	242	215
Industrial										
Total	199	174	93	137	122	161	13	21	34	25
0	0	0	4	3	23	17	0	0	6	5
1–4	0	0	2	3	12	19	0	1	2	3
5–14	0	0	0	0	1	0	0	0	0	0
15–44	7	1	3	1	6	2	1	0	4	1
45–64	208	47	55	30	88	37	12	9	54	19
65+	1544	1151	816	910	1022	1062	101	132	205	139
Nonmarket										
Total	222	268	122	200	110	144	5	9	36	23
0	0	0	2	1	10	9	0	0	2	1
1–4	0	0	0	0	1	3	0	0	1	0
5–14	0	0	0	0	1	1	0	0	1	0
15–44	21	3	7	4	12	7	1	1	11	4
45–64	325	113	146	110	109	70	9	10	81	35
65+	2246	2007	1375	1441	1265	1032	46	53	208	110
LAC										
Total	65	41	43	45	75	76	14	17	31	17
0	1	1	10	6	53	43	1	1	14	12
1–4	0	0	1	2	8	10	0	0	4	2
5–14	0	0	1	1	4	3	0	0	1	1
15–44	8	3	6	6	12	10	2	2	12	5
45–64	179	60	89	72	140	98	41	41	105	41
65+	994	682	727	690	1230	1184	200	232	299	172

Table B5. Mortality rates per 100,000 from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara										
Total	60	35	41	44	73	80	10	15	26	17
0	4	3	42	28	149	111	4	6	22	25
1–4	0	0	10	5	22	23	0	0	8	2
5–14	0	0	3	3	18	18	0	0	5	4
15–44	16	5	10	11	27	34	3	4	19	12
45–64	243	96	114	122	169	188	38	64	85	53
65+	1129	765	833	813	1193	1131	168	195	239	143
MENA										
Total	63	38	40	45	65	71	9	13	23	15
0	3	2	31	19	108	81	3	4	22	22
1–4	0	0	7	5	15	22	0	0	6	2
5–14	0	0	2	2	9	8	0	0	2	2
15–44	11	4	6	9	15	19	2	3	12	8
45–64	222	82	92	102	142	143	31	49	77	44
65+	1128	797	816	821	1167	1134	166	194	240	144
Asia										
Total	37	37	62	82	59	40	6	10	27	25
0	1	1	12	11	41	36	5	5	12	12
1–4	0	0	3	4	12	12	3	1	9	5
5–14	0	0	1	1	5	4	0	0	1	2
15–44	7	3	6	12	13	13	1	2	13	9
45–64	115	66	125	134	107	76	14	26	77	59
65+	441	564	1020	1207	860	427	71	109	233	239

	Mental disorders		**Oral health diseases**		**Micronutrient disorders**		**Malnutrition**	
World								
Total	1	3	0	0	4	7	11	5
0	0	0	0	0	13	10	75	60
1–4	0	0	0	1	4	16	77	22
5–14	0	0	0	0	2	2	2	2
15–44	0	1	0	0	1	4	0	0
45–54	2	1	0	0	5	6	2	0
65+	17	33	0	0	27	26	12	12
Developed								
Total	2	5	0	0	3	4	3	1
0	0	0	0	0	2	1	3	1
1–4	0	0	0	1	3	5	38	5
5–14	0	0	0	0	1	0	0	0
15–44	0	0	0	0	1	0	0	0
45–64	1	1	0	0	3	3	1	0
65+	25	38	0	0	21	21	7	7
Developing								
Total	1	2	0	0	4	8	13	6
0	0	0	0	0	15	12	87	70
1–4	0	0	0	1	4	18	84	25
5–14	0	0	0	0	3	2	2	2
15–44	1	1	0	0	2	5	0	0
45–64	2	1	0	0	5	9	2	0
65+	11	28	0	0	30	32	15	18

Table B5. Mortality rates per 100,000 from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	3	6	0	0	2	3	1	1
0	0	0	0	0	1	0	1	0
1–4	0	0	0	0	3	4	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	1	0	0	0	1	1	0	0
65+	29	44	0	0	14	20	5	7
Nonmarket								
Total	2	3	0	0	6	5	8	2
0	0	0	0	0	3	2	7	2
1–4	0	0	0	3	3	8	90	11
5–14	0	0	0	0	1	0	0	0
15–44	0	0	0	0	2	1	0	0
45–64	2	1	0	0	8	5	2	0
65+	17	25	0	0	42	24	11	7
LAC								
Total	1	2	0	1	6	6	6	5
0	0	0	0	0	15	12	85	68
1–4	0	0	0	6	2	3	15	9
5–14	0	0	0	0	3	1	1	1
15–44	0	0	0	0	2	2	0	0
45–64	2	1	0	0	9	9	4	2
65+	11	29	0	0	68	51	36	37
Sub-Sahara								
Total	1	1	0	0	9	11	22	8
0	0	0	0	0	22	18	142	108
1–4	0	0	0	0	3	7	87	8
5–14	0	0	0	0	7	7	5	4
15–44	0	0	0	0	5	6	1	1
45–64	3	1	0	0	17	20	5	1
65+	11	26	0	0	73	64	20	27
MENA								
Total	1	1	0	0	6	8	13	6
0	0	0	0	0	21	17	134	98
1–4	0	0	0	0	2	6	55	8
5–14	0	0	0	0	4	3	2	3
15–44	0	0	0	0	2	5	0	0
45–64	2	1	0	0	9	15	2	0
65+	11	26	0	0	64	62	17	26
Asia								
Total	1	2	0	0	3	7	12	6
0	0	0	0	0	12	9	59	51
1–4	0	0	0	0	4	27	103	36
5–14	0	1	0	0	2	1	1	2
15–44	1	1	0	0	1	5	0	0
45–64	2	1	0	0	3	6	1	0
65+	11	28	0	0	16	21	11	13

Table B6. Deaths in thousands from specific causes by age, sex, and region, 1985

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Diarrhea		**Tuberculosis**		**Acute respiratory infection**		**Measles**		**COPD**	
World										
Total	1490	1508	502	342	2970	2579	181	241	1042	901
0	702	569	6	3	717	571	65	54	178	155
1–4	164	310	13	18	1269	807	68	96	20	57
5–14	175	131	10	18	91	122	39	72	12	17
15–44	268	285	179	144	235	306	8	17	35	31
45–64	116	117	197	103	214	191	0	1	190	127
65+	65	95	96	55	444	582	0	0	607	514
Developed										
Total	10	10	31	7	212	210	1	1	212	122
0	6	5	0	0	11	8	0	0	1	1
1–4	2	3	0	1	42	30	0	1	1	3
5–14	0	0	0	0	1	1	0	0	0	0
15–44	0	0	10	0	13	2	0	0	4	1
45–64	0	0	12	1	21	7	0	0	35	14
65+	1	2	8	5	124	163	0	0	171	102
Developing										
Total	1480	1498	470	334	2758	2369	180	240	829	779
0	695	564	5	3	706	563	64	54	176	154
1–4	162	307	13	17	1227	777	68	95	19	54
5–14	175	131	10	18	90	121	39	72	12	17
15–44	268	285	169	144	222	304	8	17	30	30
45–64	116	117	185	102	193	184	0	1	155	113
65+	63	93	88	51	320	420	0	0	436	412
Industrial										
Total	2	3	9	4	124	148	0	0	159	89
0	0	0	0	0	2	1	0	0	0	0
1–4	0	1	0	0	3	4	0	0	1	1
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	2	1	0	0	1	1
45–64	0	0	3	1	9	4	0	0	20	9
65+	1	2	6	3	107	138	0	0	136	79
Nonmarket										
Total	8	7	22	3	89	62	0	0	54	33
0	6	5	0	0	9	7	0	0	1	1
1–4	2	2	0	1	39	26	0	0	1	2
5–14	0	0	0	0	1	1	0	0	0	0
15–44	0	0	10	0	11	1	0	0	3	1
45–64	0	0	10	1	12	3	0	0	15	5
65+	0	0	2	1	17	25	0	0	34	23
LAC										
Total	102	98	31	18	159	127	8	8	63	50
0	54	46	0	0	48	39	3	2	13	12
1–4	15	24	1	1	55	35	4	4	1	4
5–14	6	6	1	1	5	5	1	1	1	1
15–44	11	9	12	8	13	10	0	0	4	3
45–64	8	5	10	4	12	7	0	0	11	6
65+	8	10	6	3	27	31	0	0	33	24

Table B6. Deaths in thousands from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara										
Total	613	545	64	55	812	595	85	111	114	113
0	255	208	1	1	216	175	30	26	59	52
1–4	47	102	4	5	411	189	28	35	8	18
5–14	91	59	2	6	29	48	22	44	5	7
15–44	150	118	31	24	84	104	4	7	1	1
45–64	50	37	19	13	37	33	0	0	10	10
65+	15	21	7	5	35	47	0	0	31	26
MENA										
Total	233	274	39	37	407	334	35	52	83	77
0	142	114	1	1	122	97	14	12	33	28
1–4	25	69	2	4	211	127	14	27	4	12
5–14	26	20	1	2	12	16	6	11	2	2
15–44	23	40	17	18	21	39	0	2	4	4
45–64	10	16	13	8	14	17	0	0	11	8
65+	7	15	5	4	27	38	0	0	29	23
Asia										
Total	532	580	337	225	1379	1313	52	69	570	540
0	243	196	3	1	321	253	17	14	72	62
1–4	75	112	7	7	550	426	21	29	6	20
5–14	52	47	6	9	44	52	10	16	5	7
15–44	79	118	110	94	104	152	4	8	22	22
45–64	49	60	143	77	129	127	0	1	123	90
65+	33	47	69	38	232	303	0	0	343	339
	Polio		**Yellow fever**		**Malaria**		**Schistosomiasis**		**Intestinal parasites**	
World										
Total	15	10	4	4	79	67	8	4	60	73
0	5	2	0	0	27	21	0	0	16	12
1–4	7	5	0	3	10	6	0	0	10	34
5–14	1	2	0	0	8	9	0	0	18	18
15–44	0	1	4	0	14	14	3	0	7	5
45–64	1	0	0	0	12	10	3	2	7	3
65+	0	0	0	0	8	8	2	2	1	1
Developed										
Total	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0	0	1
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
Developing										
Total	15	10	4	4	79	67	8	4	59	72
0	5	2	0	0	27	21	0	0	16	12
1–4	7	5	0	3	10	6	0	0	10	32
5–14	1	2	0	0	8	9	0	0	18	18
15–44	0	1	3	0	14	14	3	0	7	5
45–64	1	0	0	0	12	10	3	2	7	3
65+	0	0	0	0	8	8	2	2	1	1

Table B6. Deaths in thousands from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial										
Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
Nonmarket										
Total	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0	0	1
5–14	0	0	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0	0	0
45–64	0	0	0	0	0	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
LAC										
Total	1	1	0	0	3	3	0	0	3	4
0	0	0	0	0	0	0	0	0	1	1
1–4	1	0	0	0	0	0	0	0	1	2
5–14	0	0	0	0	1	1	0	0	1	1
15–44	0	0	0	0	1	1	0	0	0	0
45–64	0	0	0	0	1	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	0
Sub-Sahara										
Total	2	1	1	1	11	9	0	0	21	20
0	1	0	0	0	9	6	0	0	5	4
1–4	1	1	0	1	0	0	0	0	3	7
5–14	0	0	0	0	0	0	0	0	9	7
15–44	0	0	1	0	0	0	0	0	2	2
45–64	0	0	0	0	1	1	0	0	1	0
65+	0	0	0	0	0	0	0	0	0	0
MENA										
Total	1	1	0	0	8	7	1	0	8	9
0	0	0	0	0	3	3	0	0	3	2
1–4	1	1	0	0	0	0	0	0	2	4
5–14	0	0	0	0	2	1	0	0	3	2
15–44	0	0	0	0	2	2	0	0	1	1
45–64	0	0	0	0	1	1	0	0	1	0
65+	0	0	0	0	0	0	0	0	0	0
Asia										
Total	11	7	2	3	57	48	7	3	26	38
0	3	1	0	0	15	12	0	0	7	5
1–4	5	3	0	2	9	5	0	0	4	20
5–14	1	1	0	0	5	7	0	0	6	8
15–44	0	1	2	0	10	10	2	0	3	3
45–64	1	0	0	0	10	8	3	1	5	2
65+	0	0	0	0	7	7	2	2	0	1

Table B6. Deaths in thousands from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Ischemic heart disease		**Cerebrovascular disease**		**Other cardio-vascular**		**Diabetes**		**Certain degen-erative**	
World										
Total	2019	1929	1608	2205	1838	1867	197	309	700	536
0	1	1	11	8	39	30	2	2	9	8
1–4	1	0	9	9	29	32	3	2	16	7
5–14	1	1	8	7	34	28	1	1	8	9
15–44	105	34	65	95	144	139	16	19	130	78
45–64	642	259	386	365	400	288	62	90	270	160
65+	1270	1634	1129	1722	1191	1350	113	195	268	274
Developed										
Total	1173	1254	585	962	669	933	58	100	196	145
0	0	0	0	0	2	1	0	0	0	0
1–4	0	0	0	1	3	4	0	0	1	1
5–14	0	0	0	0	1	0	0	0	0	0
15–44	32	5	11	6	21	10	2	1	17	5
45–64	300	97	105	82	115	67	13	12	77	34
65+	841	1151	468	873	528	851	42	86	100	105
Developing										
Total	847	675	1022	1243	1169	934	139	209	504	391
0	1	1	10	7	37	28	2	2	8	8
1–4	1	0	9	8	27	28	3	1	15	6
5–14	1	1	7	7	34	27	1	1	8	8
15–44	73	29	53	89	123	129	14	18	113	72
45–64	342	161	282	283	286	221	49	78	193	127
65+	429	483	661	849	662	500	70	109	167	169
Industrial										
Total	733	674	344	529	452	623	48	81	125	95
0	0	0	0	0	1	1	0	0	0	0
1–4	0	0	0	1	2	4	0	0	0	0
5–14	0	0	0	0	0	0	0	0	0	0
15–44	13	2	5	3	11	3	2	1	8	2
45–64	162	40	43	25	68	31	10	7	43	16
65+	558	633	295	500	369	584	37	73	74	76
Nonmarket										
Total	440	580	241	433	217	310	11	20	71	50
0	0	0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	0	0	0	0	0
5–14	0	0	0	0	0	0	0	0	0	0
15–44	19	3	6	4	11	6	1	1	10	3
45–64	138	58	62	56	46	36	4	5	34	18
65+	283	519	173	372	159	267	6	14	26	28
LAC										
Total	130	83	86	90	150	153	28	34	62	33
0	0	0	1	0	3	2	0	0	1	1
1–4	0	0	0	0	2	2	0	0	1	0
5–14	0	0	1	0	2	1	0	0	0	1
15–44	7	3	5	5	11	10	2	2	11	5
45–64	43	15	21	18	34	25	10	10	25	10
65+	79	65	58	65	98	112	16	22	24	16

Table B6. Deaths in thousands from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara										
Total	135	81	92	101	164	184	22	34	58	39
0	0	0	4	3	14	10	0	1	2	2
1–4	0	0	3	2	7	8	0	0	3	1
5–14	0	0	2	2	11	11	0	0	3	2
15–44	15	5	9	11	25	32	3	4	18	12
45–64	54	23	25	29	37	45	8	15	19	13
65+	65	52	48	56	69	77	10	13	14	10
MENA										
Total	120	70	76	82	125	129	18	25	43	27
0	0	0	2	1	7	5	0	0	1	1
1–4	0	0	2	1	4	5	0	0	1	0
5–14	0	0	1	1	5	4	0	0	1	1
15–44	9	3	5	7	12	15	1	2	10	6
45–64	45	17	19	21	29	29	6	10	16	9
65+	66	50	48	51	68	71	10	12	14	9
Asia										
Total	462	442	768	970	730	468	72	117	340	291
0	0	0	4	3	13	10	1	2	4	3
1–4	0	0	3	5	14	13	3	1	10	5
5–14	0	0	4	4	16	10	0	0	3	4
15–44	42	19	33	66	75	72	8	10	74	49
45–64	200	106	216	215	186	123	25	42	133	95
65+	219	316	508	677	428	239	35	61	116	134

	Mental disorders		**Oral health diseases**		**Micronutrient disorders**		**Malnutrition**	
World								
Total	31	64	0	3	94	158	255	117
0	0	0	0	0	8	6	46	35
1–4	0	0	0	2	8	36	178	48
5–14	1	2	0	0	13	10	8	10
15–44	5	6	0	0	16	41	2	2
45–64	6	3	0	0	17	24	6	1
65+	20	53	0	0	32	42	14	20
Developed								
Total	14	32	0	0	19	24	18	8
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	1	2	13	2
5–14	0	0	0	0	1	0	0	0
15–44	0	0	0	0	3	1	0	0
45–64	1	1	0	0	4	3	1	0
65+	12	31	0	0	10	17	3	6
Developing								
Total	17	32	0	2	75	135	237	109
0	0	0	0	0	8	6	46	35
1–4	0	0	0	2	7	34	165	47
5–14	1	2	0	0	13	10	8	10
15–44	5	6	0	0	14	40	2	2
45–64	4	2	0	0	13	20	5	1
65+	7	22	0	0	21	25	11	14

Table B6. Deaths in thousands from specific causes (continued)

Region and age group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	11	25	0	0	7	13	2	4
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	1	1	0	0
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	0	0	0	0
45–64	0	0	0	0	1	1	0	0
65+	10	24	0	0	5	11	2	4
Nonmarket								
Total	3	7	0	0	12	11	16	4
0	0	0	0	0	0	0	0	0
1–4	0	0	0	0	0	1	13	2
5–14	0	0	0	0	0	0	0	0
15–44	0	0	0	0	2	1	0	0
45–64	1	0	0	0	3	3	1	0
65+	2	6	0	0	5	6	1	2
LAC								
Total	2	3	0	1	12	11	13	11
0	0	0	0	0	1	1	5	4
1–4	0	0	0	1	0	1	3	2
5–14	0	0	0	0	1	1	1	1
15–44	0	0	0	0	2	2	0	0
45–64	0	0	0	0	2	2	1	0
65+	1	3	0	0	5	5	3	4
Sub-Sahara								
Total	2	2	0	0	20	25	49	18
0	0	0	0	0	2	2	13	10
1–4	0	0	0	0	1	2	29	3
5–14	0	0	0	0	4	4	3	2
15–44	0	0	0	0	5	8	1	1
45–64	1	0	0	0	4	5	1	0
65+	1	2	0	0	4	4	1	2
MENA								
Total	1	2	0	0	12	15	26	11
0	0	0	0	0	1	1	9	7
1–4	0	0	0	0	1	1	14	2
5–14	0	0	0	0	2	2	1	1
15–44	0	0	0	0	2	4	0	0
45–64	0	0	0	0	2	3	0	0
65+	1	2	0	0	4	4	1	2
Asia								
Total	13	25	0	1	32	83	149	69
0	0	0	0	0	4	3	18	15
1–4	0	0	0	0	5	30	120	40
5–14	1	2	0	0	5	4	3	6
15–44	4	6	0	0	5	26	0	1
45–64	3	2	0	0	5	10	2	0
65+	5	16	0	0	8	12	6	7

Annex C. Expert Assessments

This annex provides expert assessments of mortality in 1985 from some specific causes by age, sex, and region and explains how they were obtained. The basic procedure was to show the regression estimates based on WHO data and regression models to individual experts on specific diseases, with a request for corrections and supporting evidence, and to calculate alternative rates and numbers of deaths on the basis of plausible recommendations.

Those specific causes of death on which alternative assessments were made are discussed in the same order as in preceding tables. Comments were also received on neoplasms and injury and poison, but no revisions were suggested. For specific causes not covered, no comments were received.

Those causes of death left out are not necessarily less controversial. For instance, West and Sommer (1987:4) estimate 420,000 deaths annually among preschool children from vitamin A deficiency, but the regression estimates for deaths under five due to micronutrient disorders are only 58,000. More generally, a comparison in Table C1 with figures compiled by Walsh (1988:15) shows that some estimates in the literature are considerably higher than the regression estimates here. The comparisons in this table cannot be examined in detail because information on Walsh's procedures is not available. The comparisons do suggest that the regression estimates substantially understate deaths from malaria and schistosomiasis, and these discrepancies are among those examined below.

Table C1. Comparison of estimated deaths from certain specific causes in developing countries around 1985 with Walsh assessment

Disease	*Regression*	*Walsh*	*Ratio: Walsh/ Regression*	*Percent*	
				Regression	*Walsh*
Diarrhea	2978	4300	144	30.6	21.9
Tuberculosis	804	900	112	8.3	4.6
Acute respiratory infection	5127	10000	195	52.6	51.0
Measles	420	2000	476	4.3	10.2
Polio	25	2	8	0.3	0.0
Yellow fever, dengue, encephalitis	8	31	388	0.1	0.2
Malaria	146	1500	1027	1.5	7.6
Schistosomiasis, filariasis	12	375	3125	0.1	1.9
Pregnancy	218	500	229	2.2	2.5
Malnutrition, micronutrient[a]	556	2000	360	a	a

Sources: Estimates reported above and Walsh (1988:15).
[a]Walsh lists malnutrition as an associated cause, with deaths presumed to be also counted elsewhere. Therefore, this cause is not included in the calculation of percentages. These percentages are over causes included in the table only, not over all causes.

Some expert assessments differ substantially from the regression estimates. Consideration of one particular discrepancy—that for diarrhea in the 65 and over age group in Latin America and the Caribbean—is instructive. The regression estimate of the mortality rate was 105 per 100,000, intermediate among developing countries, and the expert assessment was that this should be reduced to 10 for each developing country region. For the reporting countries in Latin America as a group, the rate is actually 85. Since these countries have 53 percent of the regional population, even if no one dies from this cause in the nonreporting countries—e.g., Colombia, Bolivia, Haiti, Jamaica, and Nicaragua—a regional average of 10 is impossible. The regional rate for this age group, if the data reported to WHO are credited, cannot be lower than 45 per 100,000.

At least four explanations can be advanced for such discrepancies.

- First, nonreporting countries may in fact be so different that projecting contrasts among reporting countries does not come close to capturing their variation. This explanation may suffice where contrasts are less extreme than in this case, but is insufficient here. No matter how different the nonreporting countries are assumed to be, the recommended regional average cannot be attained.

- Second, the data reported to WHO may be poor, as is certainly the case for some countries, at least with respect to leaving some causes unspecified. In this case, reports of diarrhea deaths at older ages may also include deaths for which the underlying cause was different.

- Third, the morbidity surveys on which several of the expert assessments are based may also be inaccurate: through their focused nature they may encourage reports on the particular causes being investigated, they may incorporate associated with underlying causes, they may focus on such groups as the young with inadequate attention to others such as the elderly, or they may be somewhat dated and give earlier rather than current levels.

- Fourth, case-fatality rates, when these are used to convert cases to deaths, may be problematic. They often have a weaker basis than morbidity estimates, may well be inaccurate, and are generally broad averages that fail to reflect substantial variability by age, region, severity of disease, and so on. They are also easy to misapply, since they may have been calculated to cover periods other than a year (or without a reference period at all) or may relate only to hospitalized cases rather than the entire spectrum of disease, which survey data would attempt to cover.

We cannot assess these possibilities in every case. However, in giving the expert assessments below (Table C2), we do indicate the contrasts with the regression estimates and adjust the assessments to be consistent with estimated mortality levels and in some particulars where they appear clearly too extreme.

Diarrhea

Alternative rates were recommended for the four developing-country regions, based on a substantial number of country surveys and a report from the U.S. Institute

Table C2. Expert assessments of mortality rates (per 100,000) and deaths (in thousands) for some specific causes, by age, sex, and region, 1985

Region and age group	*Rates*		*Deaths*		*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Diarrhea				**Polio**			
World								
Total	59	61	1439	1457	1.7	1.5	42	35
0	1582	1342	977	793	19.4	16.9	12	10
1–4	100	193	233	429	12.5	10.8	29	24
5–14	23	20	126	105	0.2	0.2	1	1
15–44	6	9	72	95	0.0	0.0	0	0
45–64	6	7	23	25	0.0	0.0	0	0
65+	6	7	7	11	0.0	0.0	0	0
Developed								
Total	2	2	10	10	0.0	0.0	0	0
0	70	58	6	5	0.0	0.0	0	0
1–4	6	8	2	3	0.0	0.0	0	0
5–14	0	0	0	0	0.0	0.0	0	0
15–44	0	0	0	0	0.0	0.0	0	0
45–64	0	0	0	0	0.0	0.0	0	0
65+	2	2	1	2	0.0	0.0	0	0
Developing								
Total	76	80	1429	1447	2.2	1.9	42	35
0	1838	1559	971	788	22.7	19.8	12	10
1–4	117	226	231	426	14.7	12.7	29	24
5–14	28	24	126	105	0.2	0.2	1	1
15–44	8	12	72	95	0.0	0.0	0	0
45–64	9	11	22	25	0.0	0.0	0	0
65+	9	11	6	9	0.0	0.0	0	0
Industrial								
Total	1	1	2	3	0.0	0.0	0	0
0	5	3	0	0	0.0	0.0	0	0
1–4	2	3	0	1	0.0	0.0	0	0
5–14	0	0	0	0	0.0	0.0	0	0
15–44	0	0	0	0	0.0	0.0	0	0
45–64	0	0	0	0	0.0	0.0	0	0
65+	3	3	1	2	0.0	0.0	0	0
Nonmarket								
Total	4	3	8	7	0.0	0.0	0	0
0	164	136	6	5	0.0	0.0	0	0
1–4	11	14	2	2	0.0	0.0	0	0
5–14	0	0	0	0	0.0	0.0	0	0
15–44	0	0	0	0	0.0	0.0	0	0
45–64	0	0	0	0	0.0	0.0	0	0
65+	1	1	0	0	0.0	0.0	0	0
LAC								
Total	77	74	154	148	0.0	0.0	0	0
0	1536	1330	89	75	0.0	0.0	0	0
1–4	117	185	25	39	0.0	0.0	0	0
5–14	52	48	25	23	0.0	0.0	0	0
15–44	11	9	10	8	0.0	0.0	0	0
45–64	13	8	3	2	0.0	0.0	0	0
65+	10	10	1	1	0.0	0.0	0	0

Table C2. Expert assessments of mortality rates and deaths (continued)

Region and age group	*Rates*		*Deaths*		*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	217	212	491	489	5.7	5.2	13	12
0	3993	3294	378	308	42.3	42.8	4	4
1–4	206	455	69	151	26.9	24.1	9	8
5–14	48	32	30	20	0.0	0.0	0	0
15–44	11	9	11	8	0.0	0.0	0	0
45–64	12	8	3	2	0.0	0.0	0	0
65+	9	11	1	1	0.0	0.0	0	0
MENA								
Total	100	115	192	211	3.1	2.7	6	5
0	2141	1783	147	118	29.1	30.3	2	2
1–4	104	298	26	71	15.9	12.6	4	3
5–14	22	18	11	8	0.0	0.0	0	0
15–44	7	13	6	10	0.0	0.0	0	0
45–64	8	12	2	3	0.0	0.0	0	0
65+	7	13	0	1	0.0	0.0	0	0
Asia								
Total	47	50	592	599	1.8	1.5	23	18
0	1163	993	357	287	19.5	13.8	6	4
1–4	94	149	110	165	13.7	11.8	16	13
5–14	21	19	60	53	0.3	0.4	1	1
15–44	8	12	45	68	0.0	0.0	0	0
45–64	9	11	15	19	0.0	0.0	0	0
65+	9	11	5	6	0.0	0.0	0	0
	Yellow fever, dengue				**Malaria**			
World								
Total	0.5	0.5	13	13	12	10	299	238
0	1.3	1.3	1	1	318	244	197	144
1–4	1.2	1.3	3	3	7	6	15	13
5–14	1.0	1.1	6	5	3	3	17	13
15–44	0.3	0.3	3	3	2	2	19	24
45–64	0.2	0.2	1	1	10	7	36	27
65+	0.2	0.2	0	0	12	10	15	17
Developed								
Total	0.0	0.0	0	0	0	0	0	0
0	0.1	0.1	0	0	0	0	0	0
1–4	0.1	0.1	0	0	0	0	0	0
5–14	0.1	0.1	0	0	0	0	0	0
15–44	0.0	0.0	0	0	0	0	0	0
45–64	0.0	0.0	0	0	0	0	0	0
65+	0.0	0.0	0	0	0	0	0	0
Developing								
Total	0.7	0.7	13	13	16	13	299	238
0	1.5	1.5	1	1	372	285	197	144
1–4	1.4	1.5	3	3	8	7	15	13
5–14	1.2	1.2	5	5	4	3	17	13
15–44	0.3	0.4	3	3	2	3	19	24
45–64	0.3	0.3	1	1	15	12	36	27
65+	0.3	0.3	0	0	21	21	15	17

Table C2. Expert assessments of mortality rates and deaths (continued)

Region and age group	*Rates*		*Deaths*		*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Industrial								
Total	0.0	0.0	0	0	0	0	0	0
0	0.0	0.0	0	0	0	0	0	0
1–4	0.0	0.0	0	0	0	0	0	0
5–14	0.0	0.0	0	0	0	0	0	0
15–44	0.0	0.0	0	0	0	0	0	0
45–64	0.0	0.0	0	0	0	0	0	0
65+	0.0	0.0	0	0	0	0	0	0
Nonmarket								
Total	0.1	0.1	0	0	0	0	0	0
0	0.1	0.1	0	0	0	0	0	0
1–4	0.1	0.1	0	0	0	0	0	0
5–14	0.1	0.1	0	0	0	0	0	0
15–44	0.1	0.1	0	0	0	0	0	0
45–64	0.1	0.1	0	0	0	0	0	0
65+	0.1	0.1	0	0	0	0	0	0
LAC								
Total	0.1	0.1	0	0	3	3	6	5
0	0.1	0.1	0	0	9	9	1	1
1–4	0.1	0.1	0	0	1	1	0	0
5–14	0.1	0.1	0	0	3	2	1	1
15–44	0.1	0.1	0	0	3	3	2	2
45–64	0.1	0.1	0	0	5	2	1	1
65+	0.1	0.1	0	0	5	5	0	0
Sub-Sahara								
Total	4.4	4.4	10	10	101	77	228	177
0	7.2	7.2	1	1	1882	1386	178	130
1–4	7.2	7.2	2	2	16	20	5	7
5–14	7.2	7.2	4	4	14	6	9	4
15–44	2.0	2.0	2	2	5	10	5	9
45–64	2.0	2.0	0	0	107	76	24	18
65+	2.0	2.0	0	0	125	130	8	9
MENA								
Total	0.2	0.2	0	0	4	4	8	7
0	0.2	0.2	0	0	50	40	3	3
1–4	0.2	0.2	0	0	1	1	0	0
5–14	0.2	0.2	0	0	3	3	2	1
15–44	0.2	0.2	0	0	2	3	2	2
45–64	0.2	0.2	0	0	4	3	1	1
65+	0.2	0.2	0	0	4	6	0	0
Asia								
Total	0.2	0.2	2	2	5	4	57	48
0	0.3	0.3	0	0	48	40	15	12
1–4	0.3	0.3	0	0	8	5	9	5
5–14	0.3	0.3	1	1	2	2	5	7
15–44	0.1	0.1	1	1	2	2	10	10
45–64	0.1	0.1	0	0	6	5	10	8
65+	0.1	0.1	0	0	13	12	7	7

Table C2. Expert assessments of mortality rates and deaths (continued)

Region and age group	*Rates*		*Deaths*		*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
	Schistosomiasis				**Complications of pregnancy**			
World								
Total	1.0	0.4	25.4	9.0	20.8		499.5	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.0	0.0	0.1	0.0	0.0		0.0	
5–14	0.1	0.0	0.4	0.2	0.1		0.8	
15–44	1.1	0.2	12.1	2.5	45.0		484.8	
45–64	2.5	1.0	9.0	3.8	3.8		14.0	
65+	3.2	1.5	3.9	2.5	0.0		0.0	
Developed								
Total	0.0	0.0	0.3	0.0	1.2		7.5	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.0	0.0	0.0	0.0	0.0		0.0	
5–14	0.0	0.0	0.0	0.0	0.0		0.0	
15–44	0.1	0.0	0.3	0.0	2.5		6.6	
45–64	0.0	0.0	0.0	0.0	0.7		0.9	
65+	0.0	0.0	0.0	0.0	0.0		0.0	
Developing								
Total	1.3	0.5	25.2	9.0	27.3		492.0	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.0	0.0	0.1	0.0	0.0		0.0	
5–14	0.1	0.0	0.4	0.2	0.2		0.8	
15–44	1.4	0.3	11.9	2.5	58.6		478.2	
45–64	3.7	1.6	9.0	3.8	5.6		13.1	
65+	5.4	3.1	3.9	2.5	0.0		0.0	
Industrial								
Total	0.0	0.0	0.0	0.0	0.1		0.4	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.0	0.0	0.0	0.0	0.0		0.0	
5–14	0.0	0.0	0.0	0.0	0.0		0.0	
15–44	0.0	0.0	0.0	0.0	0.2		0.4	
45–64	0.0	0.0	0.0	0.0	0.0		0.0	
65+	0.0	0.0	0.0	0.0	0.0		0.0	
Nonmarket								
Total	0.1	0.0	0.3	0.0	3.3		7.1	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.0	0.0	0.0	0.0	0.0		0.0	
5–14	0.0	0.0	0.0	0.0	0.0		0.0	
15–44	0.3	0.0	0.3	0.0	7.0		6.2	
45–64	0.0	0.0	0.0	0.0	1.8		0.9	
65+	0.0	0.0	0.0	0.0	0.0		0.0	
LAC								
Total	4.6	0.9	9.3	1.9	16.9		34.0	
0	0.0	0.0	0.0	0.0	0.0		0.0	
1–4	0.1	0.0	0.0	0.0	0.0		0.0	
5–14	0.2	0.1	0.1	0.1	0.2		0.1	
15–44	7.0	0.7	6.4	0.6	35.4		32.3	
45–64	7.8	2.9	1.9	0.7	6.3		1.6	
65+	10.3	4.5	0.9	0.4	0.0		0.0	

Table C2. Expert assessments of mortality rates and deaths (continued)

Region and age group	*Rates*		*Deaths*		*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Sub-Sahara								
Total	2.4	1.4	5.4	3.3		54.7		126.0
0	0.0	0.0	0.0	0.0		0.0		0.0
1–4	0.1	0.0	0.0	0.0		0.0		0.0
5–14	0.3	0.2	0.2	0.1		0.6		0.4
15–44	0.6	1.3	0.6	1.2		128.6		121.5
45–64	15.2	5.9	3.4	1.4		17.3		4.2
65+	19.5	7.9	1.2	0.6		0.0		0.0
MENA								
Total	2.3	0.5	4.4	0.9		20.8		38.0
0	0.0	0.0	0.0	0.0		0.0		0.0
1–4	0.0	0.0	0.0	0.0		0.0		0.0
5–14	0.1	0.0	0.1	0.0		0.2		0.1
15–44	3.7	0.4	3.1	0.3		46.3		36.2
45–64	4.6	1.8	0.9	0.4		8.4		1.7
65+	5.9	2.5	0.4	0.2		0.0		0.0
Asia								
Total	0.5	0.2	6.1	2.9		24.8		294.0
0	0.0	0.0	0.0	0.0		0.0		0.0
1–4	0.0	0.0	0.0	0.0		0.0		0.0
5–14	0.0	0.0	0.0	0.0		0.1		0.2
15–44	0.3	0.1	1.8	0.3		52.2		288.2
45–64	1.6	0.8	2.7	1.2		3.4		5.6
65+	3.0	2.3	1.5	1.4		0.0		0.0
	Diabetes							
World								
Total	8	12	188	290				
0	3	3	2	2				
1–4	1	1	3	2				
5–14	0	0	1	1				
15–44	1	1	15	16				
45–64	16	21	56	78				
65+	90	117	110	192				
Developed								
Total	10	17	58	100				
0	0	0	0	0				
1–4	0	1	0	0				
5–14	0	0	0	0				
15–44	1	1	2	1				
45–64	11	9	13	12				
65+	87	107	42	86				
Developing								
Total	7	11	130	189				
0	3	4	2	2				
1–4	2	1	3	1				
5–14	0	0	1	1				
15–44	2	2	13	14				
45–64	18	28	43	65				
65+	95	130	68	106				

Table C2. Expert assessments of mortality rates and deaths (continued)

Region and age group	*Rates*		*Deaths*	
	Male	*Female*	*Male*	*Female*
Industrial				
Total	13	21	48	81
0	0	0	0	0
1–4	0	1	0	0
5–14	0	0	0	0
15–44	1	0	2	1
45–64	12	9	10	7
65+	101	132	37	73
Nonmarket				
Total	5	9	11	20
0	0	0	0	0
1–4	0	0	0	0
5–14	0	0	0	0
15–44	1	1	1	1
45–64	9	10	4	5
65+	46	53	6	14
LAC				
Total	14	17	28	34
0	1	1	0	0
1–4	0	0	0	0
5–14	0	0	0	0
15–44	2	2	2	2
45–64	41	41	10	10
65+	200	232	16	22
Sub-Sahara				
Total	5	5	10	11
0	0	0	0	0
1–4	0	0	0	0
5–14	0	0	0	0
15–44	2	0	2	0
45–64	10	10	2	2
65+	100	120	6	9
MENA				
Total	9	13	18	25
0	3	4	0	0
1–4	0	0	0	0
5–14	0	0	0	0
15–44	2	3	1	2
45–64	31	49	6	10
65+	166	194	10	12
Asia				
Total	6	10	74	119
0	5	5	1	2
1–4	3	1	3	1
5–14	0	0	0	0
15–44	1	2	8	10
45–64	14	26	25	43
65+	71	109	36	63

of Medicine (1986:159–162) for case-fatality rates. The recommendations were age- but not sex-specific, with age groups 0 and 1–4 combined. Older ages were separated into 15–59 and 59 and over, but the rates were identical.

The ratios of the rates from the expert assessment to the regression estimates, by age group and region, were as follows:

	LAC	Sub-Saharan Africa	MENA	Asia
0–4	1.65	1.48	1.03	1.47
5–14	4.05	0.33	0.43	1.15
15–44	0.95	0.07	0.26	0.58
45–64	0.40	0.05	0.16	0.31
65+	0.10	0.04	0.06	0.14

The inconsistency between the expert assessment for age 65 and over and reported figures for Latin America has already been noted. Either the reported deaths are grossly excessive or the expert assessment for this age group and region is wrong. The 5–14 age group for Latin America also presents a problem: the rate for reporting countries is 6.9 per 100,000, and the expert assessment of 50 could be reached (assuming the reports are accurate) only if nonreporting countries have a rate 14 times that of reporting countries. In general, the pattern of expert assessments across age groups is so different from that of the regression rates that no attempt was made to reconcile them.

Using the rates from the expert assessment, we calculated deaths within each age group and allocated these between the sexes (and, in the case of the youngest age groups, between 0 and 1–4) in proportion to numbers of deaths in the regression estimates. For all ages combined, the regression estimates and expert assessment actually produce similar results: the developing-country mortality rate is reduced marginally following the recommendations from 62 to 60 per 100,000, and developing-country deaths reduced from 3.0 to 2.9 million. However, deaths among those 0–4 are increased 40 percent and among those 5 and older decreased 63 percent.

Polio

Detailed alternative numbers of deaths were recommended based on lameness prevalence surveys reported in several publications, including a summary article by Bernier (1984). The surveys suggest that new cases worldwide are half a million, and a case-fatality rate of 15 percent (the literature suggests rates between 10 and 20 percent) was applied to obtain the expert assessment.

For industrial market and nonmarket economies and for Latin America and the Caribbean, the recommended figures were uniformly zero. However, some deaths actually were reported to WHO (e.g., 9 deaths in Sweden in 1985, and 34 in the United Kingdom), so that the expert assessment was modified to incorporate the very low regression estimates in these cases.

Adopting the recommended rates in full for the other regions leads to a substantial rise in the world mortality rate from polio from .5 to 1.6 per 100,000, and an increase in the number of deaths worldwide from 25 to 77 thousand.

The increase involves three regions with little data: Sub-Saharan Africa, the Middle East and North Africa, and Asia. Recommended rates at ages 0 and 1–4, the age groups most affected, range from 12 to 43 in these regions. Most of the reported rates for 1970 (most countries reported some deaths) are at or below the bottom of this range. For 1985, there are virtually no useful data—this cause is missing for all the Latin American countries due to reporting procedures adopted in the region for ICD-9, and includes no deaths everywhere else except in three countries, for which rates per 100,000 are as follows:

	Age 0	Age 1–4
Korea, Rep. of	15.2	15.9
Sri Lanka	1.3	1.6
Thailand	0.8	0.2

Therefore, reports of deaths to WHO are well below the expert assessments.

Yellow fever, dengue, and encephalitis

The recommendations on this category, largely judgmental, were these: (a) that yellow fever deaths in Sub-Saharan Africa be estimated at 15,000 under age 15 and 5,000 at age 15 and over, out of total numbers of cases of 75,000 and 25,000 respectively; (b) that deaths in Latin America and the Caribbean be estimated at 10 under 15 and 70 at 15 and over, out of total cases of 11,000 and 7,000 respectively; and (c) that male-female ratios equal one, and cases at 0 and 1–4 be proportional to the size of the age groups.

The equations for yellow fever were not satisfactory, and produced an irregular age pattern (not visible in preceding tables because rates are so low). The first step in revision was to smooth the rates, redistributing deaths across age-sex groups without altering the total, to give the same rate for all those under 15 and a second rate for all those 15 and over.

Next, rates were adjusted for Sub-Saharan Africa to give the recommended number of deaths, which is nine times the regression estimate. A rate of 7.2 per 100,000 for those under 15 resulted. Rates of this order were in fact reported to WHO for children under five in 1970 (for Portugal and Uruguay); in 1985, however, virtually no deaths from this cause were reported.

Rates for Latin America were not adjusted, because they would have to be lower than those for developed countries to give the recommended numbers of deaths. The regression estimates were intermediate between developed countries, on one hand, and all other developing regions, on the other, and these were maintained.

Because of the adjustment for Sub-Saharan Africa, the world mortality rate rises from .17 to .54 per 100,000, and deaths rise from 8,000 to 26,000, with Sub-Saharan Africa accounting for 75 percent of the total.

Malaria

Numbers of malaria cases were provided by region, and rough estimates of deaths for Sub-Saharan Africa and Brazil were recommended by disease experts. The prevalence estimates, on the basis of 1985 data reported to WHO, are given below, together with ratios of the regression estimate of deaths to these cases.

	Reported cases	Ratio of deaths to 1000 cases
Industrial market economies	7,353	10.7
Industrial nonmarket economies	631	12.7
Latin America and Caribbean	883,451	6.4
Middle East and North Africa	394,969	39.3
Asia	3,560,432	29.5

No 1984 or 1985 Sub-Saharan Africa reports were available, but cases were 4.8 to 7.8 million annually between 1976 and 1983. Since case-fatality rates may be anywhere from under 1 to 50 per thousand, the regression estimates of deaths appear broadly consistent with the case reports. The rate for Latin America, though lower than the others, is consistent with an analysis of deaths in 1977–82 in the Amazon and Center-Western regions in Brazil, which gave a case-fatality rate of 5.8 (Fiusa Lima, n.d.).

Nevertheless, an increase was recommended for Latin America, based on an informal estimate of 6,000 to 10,000 malaria deaths in Amazonia. (Brazil reports almost half the cases in the Americas.) With no more precise guidance, we simply doubled the number of deaths in each age-sex group for Latin America, effectively assuming that case-fatality rates are comparable to those in developed countries. Deaths in Amazonia would then be 50 to 90 percent of the revised regional total. The resulting age-specific rates are in the upper range for reporting Latin American countries. At age 0, the revised rate is 9 per 100,000; by contrast, the highest reported rates in the region are

El Salvador	7.2 per 100,000
Guatemala	5.7 per 100,000
Ecuador	4.7 per 100,000.

For Sub-Saharan Africa, estimates of deaths between 405,000 and 952,000 were recommended. If 1985 cases were in the range of 4.8–7.8 million, these expert assessments would give deaths per thousand cases between 50 and 200—ratios that are probably too high, particularly if malaria is overall less lethal in this region than in other regions. (Malaria is believed to be most lethal among migrants moving into an area where it is endemic. Lower fatality rates in settled areas of fixed endemicity may be expected.) We therefore chose the lower expert assessment of 405 thousand and adjusted deaths in each age-sex group proportionally to reach this total. This implies a mortality rate 20 times the regression estimate.

For the world as a whole, the revised mortality rate rises from the original estimate of 3 to 11 and the number of deaths from 146,000 to 537,000, with 75 percent of them in Africa.

Schistosomiasis and filariasis

Two sets of age- and sex-specific morbidity estimates were provided for each developing country region, one based on Pike (1987:204–205) and another on Walsh (1988:15), and various case-fatality rates ranging from 2.5 to 5 percent, and averaging 3.5 percent, were recommended.

First we observed that multiplying the average of the morbidity estimates by a constant case-fatality rate would produce an age distribution of deaths similar to that of the regression estimates (though very different in total) only if one assumed a ten-year lag, i.e., that average duration from initial infection to death is 10 years plus the average current duration of infection. Making the bold inference from this that those who die of schistosomiasis do so on average ten years after infection, we adopted ratios of deaths in the current year to current cases that are a tenth of the recommended case-fatality rates. (Note that these ratios are not strictly case-fatality rates, and depend on complicated assumptions about whether numbers of cases have been rising or falling and how long a case stays active if death does not occur.) We did allow these ratios to vary by region, assuming a simplified distribution of the three principal species: we chose a high ratio of .0050 for Asia, assuming *Schistosomiasis japonicum* is more lethal than other species; .0035 for Latin America and the Middle East, where *S. mansoni* may have intermediate lethality; and .0025 for Sub-Saharan Africa where *S. hæmatobium* is the least lethal. The last parameter is consistent with a reported estimate of a cause-specific mortality rate of 2 per thousand per year among heavily infected men in Zanzibar (Morrow n.d.:Table 4). The parameter choices were made to minimize deaths from this cause. Similarly, we took the lower set of morbidity estimates, based on Walsh (1988:15), with the additional argument that the other set used mid-1970s data. Total deaths by region calculated using these assumptions were distributed among age-sex groups, using the distribution in the regression estimates.

Even with the choice of minimizing parameters, the resulting revision raises the world mortality rate from 0.25 to 0.70 per 100,000 and increases deaths from 12,000 to 34,400. The revision gives rates for Latin American males 45–64 of 7.8 per 100,000, and for males 65 and over of 10.3. For comparison, the highest reported rates for males in Latin America and the Caribbean in 1985 are these:

	Age 45-64	Age 65+
Suriname	4.4	15.9
Guyana	2.2	8.6

No other reporting country in the region has rates close to these. Even with minimizing assumptions, therefore, the revised mortality rates are still high in comparison with reported rates.

The revised Asian rates are lower and more reasonable—and possibly even too low, since we estimate Chinese rates per 100,000, from survey data, at 4.1 for males 45-64 and 9.0 for males 65 and over.

Complications of pregnancy

WHO compiled maternal mortality rates from a variety of sources for around 1983, and these provide our expert assessment. The compilation is based on

> information available at the headquarters of the World Health Organization—in the library, in the documentation centres and in the possession of individual members of the staff. All relevant data bases—e.g. MEDLINE, POPLINE—were searched, as were national yearbooks, the reports of consultants, needs assessment missions, evaluation studies, etc. Helpful colleagues around the world who know of our interest also provided information (WHO 1986:4).

With this type of search, a possible upward bias in the results, unless a rigorous standard of data quality is imposed, cannot be excluded. Such a bias could occur because of selective reporting of higher (and therefore more "interesting") figures, selective dismissal of reports including no maternal deaths (e.g., because of lack of evidence whether the category was used), and the utilization of somewhat older data where nothing else is available. No attempt to minimize this bias is evident in the report, which in fact goes out of its way to cite exceptionally high figures in a brief overview.

Maternal deaths are more commonly expressed in relation to live births rather than to population. Reexpressing the regression estimates as a rate per 100,000 livebirths gives this comparison with the WHO report (where the Middle East and North Africa region is made up by combining Northern Africa and Western Asia from the WHO report):

	Regression estimates	WHO (1986)
Developing countries	191	450
Latin America and Caribbean	103	270
Sub-Saharan Africa	229	680
Middle East and North Africa	153	430
Asia	204	420

The WHO (1986) figures, it should be noted, do not appear to be simple averages of those collected in the report. Though they are probably based on these data, their specific derivation is not explained. The differences between these figures and our regression estimates are substantial. In mining the WHO report for statistics to include in the World Development Report, the World Bank (1988:286) rejected some of the higher numbers as inconsistent among themselves, ending up with reduced average maternal mortality rates of 329 in low-income economies and 381 in middle-income economies. A further reduction would be necessary to agree with the regression estimates, as well as with deaths reported to WHO. For Latin America and the Caribbean, for instance, reporting countries have a maternal mortality rate of 75. If this

rate is credited, the nonreporting countries would need a rate of 540—somewhat too high to accept—to produce the WHO (1986) figure. Similarly, for Asia, reporting countries (among which we count China and rural India) have a rate of 202, and a rate of 1048 would be needed in the nonreporting countries to produce the WHO (1986) figure.

Adopting the WHO (1986) estimates, and applying age distributions from the regression estimates, would raise deaths due to complications of pregnancy from 218 to 492 thousand in developing countries, an increase of 130 percent.

Diabetes

For diabetes, the recommendations were essentially subjective: to replace Sub-Saharan African rates with rates lower than developed country rates; to reduce Asian rates to reported levels for Korea, Singapore, Thailand, and Hong Kong, treating these as setting an upper bound; to reduce rates for Latin America somewhat; to eliminate deaths at age 0; and to allow a nominal number of deaths, say 1 in 100,000, at age 5–14.

The revised African rates were adopted. The Asian rates were not changed because calculations subsequent to those provided to the expert had already reduced them. Latin American rates were not changed for various reasons, including the suspicion that there may be higher rates in the Caribbean. Deaths at age 0 were not eliminated because such deaths were in fact reported. And increasing the rate at 5–14 was not thought necessary because the regression estimates are in fact nonzero, though quite small.

The result of changing the African rates is to reduce world mortality rates slightly from 10.5 to 9.9 and deaths from 507,000 to 477,000.

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